RAILROAD GAZETTE

FRIDAY, DECEMBER 21, 1900.

CONTENTS

ILLUSTRATED:
The Erie's Six-Wheel Switching Locomotives with Wide Fire-box..... 836
American Practice in Block Signaling—XII..... 838
The American Car Ventilator..... 841
Car Journal Bearings and Hot Boxes..... 843
The Bessemer Heavy Traffic Freight Route..... 846
The Camden & Woodbury Railroad Engines..... 847
EDITORIAL:
Brown's Discipline..... 844
Belgian Railroads in 1898..... 845
Editorial Notes.....844, 845
New Publications..... 845
Trade Catalogues..... 846
CONTRIBUTIONS:
The Railroad Clubs..... 835
H. J. Hayden..... 835
The Design of Freight Yards..... 835
MISCELLANEOUS:
"Record Discipline" 835
Standard Draft Gear and Coupler..... 836
A Locomotive Museum..... 836
Locomotive Design..... 839
Railroad Employees' Relief..... 841
The South Carolina 1901 Exposition..... 842
The Lighting of Trains..... 843
Big Cars in England Again..... 847
New Railroads in Virginia..... 848
Electric Power Transmitted 153 Miles..... 848
GENERAL NEWS:
Technical 848
The Scrap Heap..... 849
Locomotive Building..... 849
Car Building..... 850
Bridge Building..... 850
Meetings and Announcements..... 850
Personal 851
Elections and Appointments..... 851
Railroad Construction..... 851
General Railroad News..... 852

Contributions

The Railroad Clubs.

Denver, Colo., Dec. 9, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

As an officer of the Rocky Mountain Railway Club I am obliged to you for your editorial note concerning us and our "modest hope." (See *Railroad Gazette*, Nov. 30. p. 795.) I do not know that I can prove the proposition, but I have been impressed, especially since I have been actively connected with club work, that the influence of the club (and no doubt the same thing is true of other clubs) is to give the members an appetite for information, which they will seek to satisfy by subscribing for the *Railroad Gazette*. V. P.

H. J. Hayden.

New York, Dec. 15, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I have read with much interest the account in your paper of Horace J. Hayden, called by his friends John Hayden. The portrait is excellent, and the account given of the man's character is very good. There are, however, some mistakes in the narrative portion which perhaps it is well to corerct. I knew John Hayden well, especially during the early part of his railroad career, and he was a man for whom I always had a very high respect.

He graduated at Harvard College in the class of 1860, not 1859, as stated in your article. Among his classmates there were three Welds, one of them a son of William F. Weld, to whom he probably owed his first appointment on a railroad. His career with the Burlington road was very brief, and I think amounted to no more than his entering the office of the Burlington & Missouri River Railroad at Burlington (it was before the consolidation of that line with the C., B. & Q.) to give him a preliminary training. He was there only a few months and possibly only a few weeks. He came to Kansas City in 1868 as General Freight Agent of the Missouri River, Fort Scott & Gulf Railroad. At that time the railroad was but 20 miles long, and though he received his title as General Freight Agent from the start, he at first acted as Station Agent at Kansas City, his duties among other things including selling tickets and his only office being in a small wooden station in the west bottom near where the Kansas City Union Depot now stands. Kersey Coates, an old resident of Kansas City, was the President of the railroad; B. S. Henning, who died last summer, was Superintendent; O. Chanute was Chief Engineer and a man named Bryant was the local Treasurer. These five, including Hayden, were the names on the first circular issued by that company asking exchanges of annual passes (for the year 1869). Mr. James F. Joy was the power above. Of these six Mr. Chanute is the only one now living. As the railroad was extended, its business increased, and Major Hayden soon gave up his duties at the station and became the traffic man of the railroad. He continued there till 1873, when he went to Boston as General Freight Agent of the Boston & Albany Railroad.

The chief other error in your article is the statement that he came to the New York Central & Hudson River Railroad on the death of Mr. Rutter. He came there during Mr. Rutter's lifetime, and I always supposed that he was selected for the place by Mr. Rutter, but I was told last night that the selection was really made by William H. Vanderbilt on the recommendation of Mr. Bliss, of the Boston & Albany Railroad. He was in New York, I think, for some years before the death of Mr. Rutter. Major Hayden began his traffic work at the age of 28, and his whole life was devoted to the service of but three corporations, two of which were always intimately connected and have now become united by lease. G. S. M.

The Design of Freight Yards.

December 8, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Mr. Delano's paper on the design of railroad freight yards, printed in your issue of Nov. 30, is a valuable addition to the somewhat sparse literature of this important subject. He gives due prominence to the first necessity if quick and cheap results are to be secured; that is, the necessity of moving cars through yards always in the same direction. He further shows that such a continuous movement can be secured only by making up your yard of two systems of tracks, the first to receive the trains as they come in from the road, and the second to classify the cars.

If we may judge by results, it may fairly be assumed that most of our railroad men have very hazy ideas on the subject of yard design and it is probably as well that Mr. Delano did not much elaborate on these general ideas. Those who have already accepted them would doubtless be glad to have his views on the minor difficulties experienced even with a well-designed yard. Where should the repair tracks be placed? Where should the scales go, and the roundhouse? What arrangement of tracks gives most freedom to the road engines with least interference in the yard work? How about shifting cars in station order? These are only a few of the questions of detail as to which Mr. Delano could have enlarged. But all this is useless for those who have not accepted the general principles of yard design, and as hinted above, it is to be feared that most of our railroad men have very hazy ideas on the subject, if, indeed, they have any such ideas further than a desire to get as much "storage room" as possible.

Some few years since, a friend of mine, a transportation man, was indulging in violent invective against a yard so designed that it was difficult to get cars into it and well-nigh impossible to get them out again. A young engineer, his junior in the service, listened for a while and then remarked, in perfect good faith:

"Why, you speak of a yard as if it were a machine to accomplish results with. I have always thought of a yard as a place where so many cars were to stand."

This is the point of view of too many engineers, and they are too often confirmed in it by transportation men who continually demand "more storage room" or "more tracks" when they really need a better design of yard, a design which will enable them to receive trains quicker, and dispatch trains quicker. The complaint is catching, too, for if an ill-designed yard cannot keep up with the movement, the cars will accumulate behind it, near and far, and a Yardmaster a hundred or two miles back may feel compelled to clamor for "more storage room" when the root of the difficulty is in the design of a yard on a distant division.

Under such circumstances details must wait, and those who appreciate what a yard should be must stick to axioms. Here are some:

A yard is not to stop cars but to keep them moving.

You must have a separate yard to receive your trains in.

Every track in your receiving yard must connect with every track in your shifting yard proper.

A good yard will save you money.

These axioms are not phrased better than Mr. Delano's. They are only phrased differently in the hope that by giving the same truths a different guise they may be advanced somewhat. In all probability these truths must be stated many times again before they are generally accepted.

Leaving generalities, there are details in which there is an opportunity for difference of opinion. Mr. Delano pronounces in favor of "scissors" ladders between receiving and shifting yards. There are doubtless cases where in a confined space scissors are desirable. As stated by Mr. Delano it is sometimes an advantage to have tracks of unequal length, but if the switches on a ladder are to be handled by levers it is so much more convenient to have the switchlamps all in one line that in a large yard it would seem that a straight ladder is well-nigh necessary, at least at the entrance.

Again, Mr. Delano speaks of the advantages and disadvantages of poling engines as compared to the old-fashioned back and forth shifting, but he does not speak of the use of pushing engines, a third method of shifting which is advantageous in yards of certain design.

But such differences of detail are of no importance in comparison with the main principles of yard construction which Mr. Delano states so well. G. F. J.

"Record Discipline."

At the October meeting of the Rocky Mountain Railway Club, held at the American House, Denver, Oct. 20, a paper was read by Mr. Charles Dyer, General Superintendent of the Colorado & Southern, on Brown's Discipline. Mr. Dyer has held his present position only about one year, but he has had experience with record discipline on other roads. In opening he called attention to the fact that record discipline is substantially the same system that has been in force at the National Military Academy at West Point for many years. At that institution demerit marks are entered with great strictness, and cadets are expelled when their demerits exceed a certain maximum. Mr. Dyer's circular, issued when he introduced the new system last April, is a model of clearness. It sets forth the usual conditions, which need not be repeated here. Bulletins announcing the results of discipline for misconduct are issued not oftener than once in two weeks. No suspension will be made for less than 10 or more than 60 days. Reprimands and suspensions are cancelled by a perfect record for a certain length of time; a reprimand by three months, a suspension of 30 days by one year, etc. The company reserved the right to change these bases of cancellation if found to bear unjustly on either the employees or the company.

Mr. Dyer looks upon the provision for rewards for meritorious service as the salient feature of the system. He finds that the men do not treat the new method lightly; there are more requests for leniency than when suspensions were actually enforced instead of being simply entered on the book. It is a marked benefit to the discipline to avoid having men lying around out of work. Such idle men, in their aimless strolls around the city, find plenty of friends, and at the end of 10 or 15 days the idler generally finds that his spare change has been spent (for cigars, if not for liquor) and if he is specially generous very likely he has run into debt, and thus he has started a bad habit which, if he had kept at work, he would have avoided.

The educational feature of the bulletins is most valuable, all employees receiving the benefits of each individual's mistakes. The Division Superintendent should give personal attention to the bulletins; he will be repaid by having fewer cases to investigate. Each road must decide for itself how many demerits shall call for dismissal. The Division Superintendent should examine each man's record frequently and if demerits are found to be piling up too fast the man should be called in and talked with. In most cases this has the desired effect; the man makes a more determined (and successful) effort to improve himself.

When suspensions were first abolished many officers were too free with demerit marks, thinking they were not so bad as actual suspensions and loss of pay. This is not the right way; each case should be treated exactly as though each mark were an actual suspension for one day. To secure the best results all the officers on a road should, by means of the bulletins, act with unity of purpose, so that the basis of rewards and punishments shall be the same throughout the company's lines.

The objection that record discipline gives an officer opportunity to discriminate in favor of his friends has no basis in fact, for the opportunity is the same under any system.

Discussion of Mr. Dyer's paper was participated in by Mr. G. W. Rhodes (B. & M. R.); Mr. Quereau, Chairman of the meeting; Mr. F. Harris (D. & R. G.), and Mr. James Humphreys (C. & S.). Mr. Rhodes is in full accord with Mr. Dyer's views. The abolition of suspensions and the introduction of a more rational plan are demanded by the progress of the age. If he had no American citizens under him the speaker would not, perhaps, adopt Brown's method. The value of a citizen depends upon his intelligence and his exercise of the habit of thinking; the same argument applies to the railroad employee. Fifty years ago experienced officers doubted whether corporal punishment could be abolished in the army and navy; but it has been abolished, and where now is there any better discipline than in the military and naval service? We ought to take more care to make records of meritorious conduct. If a train is delayed five or ten minutes the men in charge have to explain; why not give them credit when they make up half an hour?

Mr. Quereau believed it desirable to always speak of "record discipline"; not because Mr. Brown is not justly entitled to all the credit which is given to him, but because the name, "Brown's discipline," is sometimes associated with one particular method, whereas there are several methods. The underlying principle of all methods is that records shall be kept, of each man's conduct, and suspension shall be abolished. The investigation of misconduct can be the same with any plan. The advantage to the men by abolishing suspension is the saving of wages; to the company in not needing so many extra men. This last is also an advantage to the regular men, as there is less hazard in the work when there are fewer irregular employees. The speaker then went on to quote letters from a number of roads, giving their experience. On one division of the Canadian Pacific and on one of the Pennsylvania Lines West of Pittsburgh the Brown system was used for some time and then discontinued; but the letters do not give any satisfactory reason, except that on the Pennsylvania it was said that the results, after four years, did not justify the continuance of the plan. The other letters are all favorable. We condense:

Kansas City, Fort Scott & Memphis: Began the new plan Oct. 1, 1895; the service has been greatly improved and the new is beyond comparison with the old plan.

Boston & Maine: March 1, 1896; very satisfactory results.

Southern Pacific: Over four years; very satisfactory, both to company and employees.

Chicago & Northwestern: In use four years in a modified form; reasonably good results.

Northern Pacific: All of the Division Superintendents

have repeatedly stated that the new system is much superior to the plan involving suspensions.

Wabash: New method in use nearly three years; satisfactory to employees and to the company; fewer extra men are required.

Missouri, Kansas & Texas: Abolished suspensions in July, 1896; the new method has worked to the entire satisfaction of the company and the employees.

The Superintendent of a large road, not named, writes that record discipline is not in use where he now is; but he has had experience with it on other roads and thinks it far superior to disciplining by suspension. Where he used the record, no credits were recorded merely for continued satisfactory service, but when it became necessary to make a debit entry against a man the length of time which had elapsed since the last debit entry was, of course, considered, and this was equivalent to giving credits.

On the Louisville & Nashville the number of employees subject to the Brown system in 1898 was 4,294; in 1899, 5,979; wages saved in the former year, $56,297; in the latter, $71,513. It will be noted that the number of employees increased 39 per cent., while the saving in wages increased only 27 per cent., indicating a decrease in the number or length of suspensions.

The Traveling Engineers' Association in 1897 voted unanimously in favor of the Brown system. Mr. Quereau closed by giving a list of the roads on which record discipline is now in force, as follows: Atchison, Topeka & Santa Fe; Boston & Maine; Buffalo & Susquehanna; Chicago Great Western; Chicago & Eastern Illinois; Chicago, Milwaukee & St. Paul; Chicago & Northwestern; Chicago, Peoria & St. Louis; Chicago, Rock Island & Pacific; Colorado & Southern; Columbus, Hocking Valley & Toledo; Columbus, Sandusky & Hocking; Erie; Illinois Central; Kansas City, Fort Scott & Memphis; Long Island; Louisville & Nashville; Maine Central; Minneapolis, St. Paul & Sault Ste. Marie; Missouri, Kansas & Texas; Norfolk & Southern; Northern Pacific; Pittsburgh, Bessemer & Lake Erie; Southern; Southern Pacific; St. Paul & Duluth; Toledo & Ohio Central; Toledo, St. Louis & Kansas City; Union Pacific; Wabash; Wheeling & Lake Erie. This list is not complete.

A Locomotive Museum.

The Dean of the Schools of Engineering at Purdue University has sent the following note to the Secretary of the Western Railway Club:

"As the Club has many times shown its interest in matters affecting the training of young men for railroad service, it occurs to me that the membership will be interested in a statement concerning a proposed locomotive museum. The Trustees of Purdue recognize that certain classes of locomotives which have long done service on American roads are now giving way to newer and heavier machines. In the natural order of events the old will be converted into scrap, and unless an effort is made to preserve them, designs which have been familiar to past generations will completely disappear. The occasion calls for a collection of typical machines, and it is believed that it is not inappropriate that Purdue should take the initiative in forming one. In accomplishing its purpose, the University must necessarily depend upon the co-operation of railroad companies. It asks, therefore, that roads having engines which for any reason are distinctive, consider the advisability of preserving a sample at Purdue. It is not expected that engines will be offered so long as they are useful to the roads owning them, but only that as engines are put out of service, one be sent to Purdue instead of being scrapped. It is not asked that any transfer of ownership be made. The University is prepared to agree to meet transfer charges, to house and to otherwise care for engines thus deposited, and to hold the same at all times subject to the order of the owner. The fact should be noted that it is not the purpose of the University to collect engines for the purpose of securing numbers. The engine to be desirable must be distinctively different from others of the collection.

"Three engines have already been secured. One of these is to come as a gift from a Western road which, for the present, desires its name to be unknown. It is of the eight-wheel American type, as built 30 years ago. It represents the class of engine which first performed the transcontinental service of our country. The second engine is to come through the courtesy of the Baltimore & Ohio, and represents the "camel-back" type which has so long been in service upon that road. The third is the English engine "James Tolman," which was exhibited at the World's Fair in 1893, and which has since been in the keeping of the Chicago, Milwaukee & St. Paul. There is needed of the old class of engines one of the single driver type, and one having inside cylinders, also, types of switching engines. As time goes on a representative of the higher class of mogul and consolidation will doubtless be obtainable.

"For the accommodation of such engines as have already been assured, a rough shed will be provided but in time it is hoped that a suitable engineering museum building will be provided which will serve as a place of deposit for the very large amount of museum material which is now either the property of Purdue or has been entrusted to its keeping."

This is an admirable enterprise and we hope it will succeed, as it probably will, for no doubt a good many railroad officers will be ready to help. Unfortunately, many particulars of practice in our earliest railroading can now never be brought to light as all of the first generation of those who built and worked railroads in this country are dead. It would be a pity, however, if there could not be found in the country enough liberal-minded and enthusiastic people to preserve from oblivion the material and methods of the second stage of railroading, and this enterprise of Purdue comes soon enough to secure specimens of some very early locomotives. The only particular suggestion that we have to make at this moment is that when the "James Tolman" is put in place a placard be attached to it reading something like this: "To be studied as an example of things not to do."

Standard Draft Gear and Coupler.

Continuing the publication of letters of railroad officials expressing opinions on a standard draft gear and coupler, the views of a president, a mechanical superintendent, and a vice-president and general manager are here given, in the order named. Other articles appeared in our issues of Nov. 16, pp. 749, 756; Nov. 30, p. 794; Dec. 7, p. 804; and Dec. 14, pp. 822, 823.

I hardly think it is practicable to select some one standard coupler and draft gear for heavy freight service. I believe a limitation should be put on those that can be used, but to select only one would lead to complications which can easily be understood. We ought to start and eliminate the poor designs now.

I question whether there would be very much advantage in undertaking to secure uniformity of construction of couplers, and there would be great difficulty in the way. I am inclined to think that nearly all the essential points in the construction of a coupler are now public property, and if there was any special disposition in this direction, any railroad company could have a good, practical coupler without infringing any patents. If this is not the case at present, it very shortly will be. The fact of the matter is that the efficiency of the M. C. B. coupler at present is very largely a matter of design and material, and it is my opinion that the labor spent in endeavoring to reconcile the various minor patents controlling these devices would be wasted.

I am glad that Mr. Westinghouse has put this subject in motion. His suggestions are on the right lines so far as the necessities of the case are concerned. His device is undoubtedly the best we have any knowledge of, and it is, I think, impossible to say at this time how it can be improved upon. We all know that the draft springs in common use are incapable of performing the proper functions, and it is safe to say that, as a rule, the draft spring is compressed solid most of the time it is in use, which, of course, destroys its elasticity, causing lost motion and undue strains on the draft rigging throughout. This can well be called a vital question, and therefore needs prompt attention of the highest order. We find that about 50 per cent. of the bad order cars are shopped on account of defective draft rigging.

Referring to the coupler question, it does not seem to me that there is any doubt as to the necessity for taking it in hand for prompt and vigorous treatment. We have too many kinds of couplers, and must continue the study until a better coupler is found, or at least until it is decided that the number of kinds of couplers in use shall be reduced to less than ten, or, if possible, less than five, and that the number finally decided upon shall be an improvement on the best coupler now used.

The Erie's Six-Wheel Switching Locomotives—Wide Fire-Box.

About Jan. 1, 1899, Mr. A. E. Mitchell, Superintendent of Motive Power of the Erie Railroad, began the design of a wide fire-box switching engine that should have certain of the advantages of the Wootten fire-box, without separating the engineer and fireman. The details were complete on March 20, the work was authorized on April 25, and six boilers were ordered from the Baldwin Locomotive Works, May 11. The six engines, Class B-2, Nos. 685 to 690 inclusive, were built in the Erie's Susquehanna shops, and the first engine went into service in the Jersey City yards, Dec. 6, 1899. Incidentally, it may be said that these engines, in addition to doing good work at switching since that time, have been an important part of the Erie Railroad Company's fire service, as they are all fitted with the "Haven Jet" fire apparatus.

In designing these engines due consideration was given to the possibility of later using the same general boiler design, with greater depth of fire-box, for burning soft coal at high speeds; also to the possible wish to use any of the several wheel arrangements that constitute the conspicuous differences between "Atlantic," "Columbia" and plain "Mogul" types. It is apparent from illustrations here given that by raising the front frames to the desired height and deepening the fire-box, for which there is opportunity, this design is capable of a very general wheel adaptation. The engines burn the common mixture used on the Erie railroad east of Hornellsville, as mentioned in Erie Notes, in the *Railroad Gazette*, Nov. 16, namely, 35 per cent. bituminous and 65 per cent. "bird's-eye" anthracite. For this kind of fuel the present proportions of fire-box and grate are ample in switching.

This is the earliest record we have obtained of the application of a moderately wide and deep fire-box, above the frames, in the manner illustrated. The closest parallel of which we know is the "Prairie" type, Class R, Chicago, Burlington & Quincy freight engine, illustrated in this paper March 30 and June 22. An inspection of the designs may be found interesting, in view of the great importance that now attaches to the design of fire-boxes. It is evident that Mr. Mitchell, in working out the Erie engine, built broadly for the future, while providing an efficient engine for the needs of two years ago. We are not aware of anything that debars this design from first place, in point of time, in the building of a wide fire-box engine that keeps engineer and fireman together in a single cab at the boiler head. The main dimensions and prominent features of the engine are given in the general specifications. The weight distribution is shown by diagram in Fig. 1.

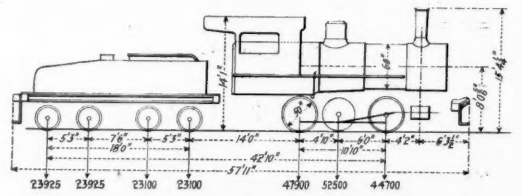


Fig. 1.—Weight Diagram—Erie Six-Wheel Engine.

The front frame and cylinder fastening, which has proved entirely satisfactory, is a simple and substantial arrangement, shown in Fig. 2. Other illustrations, general and in detail, are shown in group. Among interesting details, attention is directed to the arrangment of the cast-iron shaking grates and the truss support of the grate frames; the staying of the boiler, the two front rows of crown stays being button head slings; the dip of the front water space, with its washouts; and to a sensible sort of exhaust nozzle tip that admits of ready change to suit conditions of fuel and work.

General Specifications.

Cylinders	19 in. x 26 in.
Driving wheels, diameter	50 in.
Driving axle journals	8½ in. x 12 in.
Weight on drivers	145,100 lbs.
Number of flues	290
Length of flues	11 ft. 6 in.
Outside diameter of flues	2 in.
Heating surface of flues	1,746 sq. ft.
Heating surface of fire-box	133 sq. ft.
Total heating surface	1,879 sq. ft.
Fire-box	Straight
Fire-box, depth above grates	4 ft. 4½ in.
Fire-box, length inside	113¾ in.
Fire-box, width inside	66 in.
Fuel	"Bird's-eye" (hard) and soft, mixed
Grates	Cast iron shaking
Grate area	52 sq. ft.
Ratio of heating surface to grate area	36
Ratio of heating surface to cylinder volume	229
Tractive power, per 1 lb. pressure	187.72 lbs.
Steam pressure carried, 180 lbs. to 200 lbs., as found necessary.	
Height to top of cab	14 ft. 1 in.
Height to center of boiler	8 ft. 5⅝ in.
Height to top of smokestack	15 ft. 4¼ in.

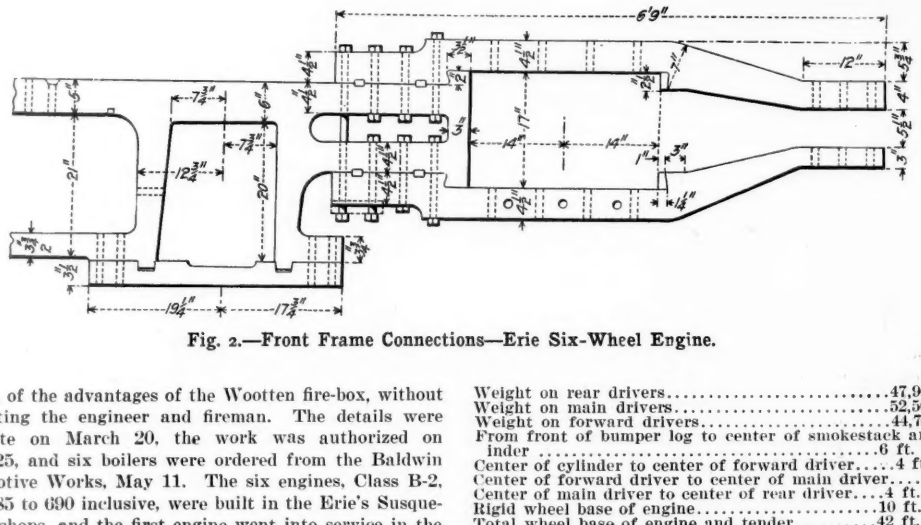


Fig. 2.—Front Frame Connections—Erie Six-Wheel Engine.

Weight on rear drivers	47,900 lbs.
Weight on main drivers	52,500 lbs.
Weight on forward drivers	44,700 lbs.
From front of bumper log to center of smokestack and cylinder	6 ft. 3½ in.
Center of cylinder to center of forward driver	4 ft. 2 in.
Center of forward driver to center of main driver	6 ft.
Center of main driver to center of rear driver	4 ft. 10 in.
Rigid wheel base of engine	10 ft. 10 in.
Total wheel base of engine and tender	42 ft. 10 in.
Capacity of tender	Water, 4,500 gallons; coal, 6 tons
Weight of tender, light	41,620 lbs.
Weight of tender, loaded	94,050 lbs.

terials, the correct proportions of boiler, etc., apply to both passenger and freight locomotives, and in these days, when so much is desired of both classes, as great care is necessary in designing one as the other. Some of the matters mentioned have more or less bearing upon the fuel economy of the engine. This feature should, of course, be kept in mind constantly, for not only will money be saved in operation, but the fireman's duties will be lightened, or a greater service rendered for the effort on his part. I believe piston valves will accomplish something in this direction, some of the economy resulting from a reduction of the internal friction of engine, but most of it being accomplished through the reduction of cylinder clearance, which is possible with this valve. The valve can be made as long as the cylinder, the steam ports short and straight, and the clearance as low as 5 or 6 per cent. Much less than this cannot be used in conjunction with the link motion. The piston valve must have internal admission if the clearance is to be reduced. This construction also has the advantage of keeping the live steam passages in the cylinders and saddle away from the outside walls so that the loss from radiation is reduced.

Internal admission reverses the direction of motion of the valve as compared with common slide valve practice. Consequently, if no other changes are made in the valve motion, the eccentrics must be set directly opposite their present position with relation to the cranks. This involves crossed eccentric rods and a very unequal distribution of steam in the cylinders. The remedy is to do away with the rock shaft or use what is commonly called the "Marine" link, in which the eyes for the eccentric rods are at the ends of instead of on the back of the link. The "Marine" link requires a larger eccentric throw for a given valve travel, and it would seem as if the omission of the rock shaft is the easiest solution of the difficulty.

Compounding is also a possible means of economy of fuel, but that subject is so broad that it cannot be entered upon at this time. However, matters pertaining to economy are certain to become more and more prominent in the future, and undoubtedly scientific investigations into the sources of loss in locomotive performance will be much more common than at present.

The allowable stresses in materials vary greatly in different parts of the engine, and the same is true of pressures upon bearings. On driving boxes the pressure seldom exceeds 200 lbs. upon the area represented by the rectangle of the bearing, that is, the diameter times the length. On the main pins this pressure may be as high as 1,600 lbs. per square inch, and no trouble from heating or excessive work will result. The pressure upon the cross head pins may rise to 3,000 lbs. per square inch. The allowable stresses, as far as they can be calculated, cover almost as wide a range as do bearing pressures. The only stresses that can be calculated in locomotive frames are those due to steam pressure on the piston, and these may be as low as 2,000 to 3,000 lbs. per square inch in some portions of the frames, and yet the latter be none too strong to stand the other stresses to which they are subjected; in fact, locomotive frames can be correctly proportioned only through experience with earlier designs. In the main rod strap the fiber stresses should not exceed 5,000 to 8,000 lbs., whereas, in the main rod body the maximum stresses can go to 10,000 lbs. per square inch; and so throughout the entire locomotive the limits to calculative stresses have been found by actual experience. No greater mistake can be made in the design of details than to materially exceed the stresses that have been found to be satisfactory in service. I have in mind a case of a number of locomotives built some years ago in which the main crank pins were entirely too small in diameter. They ran for several years without any fractures, and then in one week five main pins were broken on 11 engines. Calculation showed that the maximum fiber stresses were more than 25,000 lbs. per square inch. One ought to make it an inexorable rule not to increase fiber stresses or decrease bearing areas in essential parts beyond the safe limits established by experience. . . .

The American Car Ventilator.

The car ventilating device here illustrated has for some time been in operation in passenger cars on the Philadelphia & Reading. It is put on the market by the American Car Ventilator Company, Betz Building, Philadelphia. The company was lately organized with a paid-up capital stock of $250,000. The officers are E. H. Johnson, President; C. F. Kindred, Treasurer, and Leo Bader, Secretary.

The idea of the design is quite plain from the illustrations, Fig. 1 showing an interior view of the clear story of a day coach with the device in place, and Fig. 2 giving plan and sections. In cases on the top of the car are placed vanes or air motors that are driven by the admission of external air while the train is in motion. On shafts directly connected to these motors are hung the fans within the clear story of the car. The openings of the intakes are placed at right angles with the length of the car and the admission of air is controlled by valves thus governing the amount and direction of air admitted according to requirements. The exit of vitiated air is through ventilators in the clear story, circulation being induced by the fans in the position shown. The motors and fans run on ball bearings which require oiling but once a year.

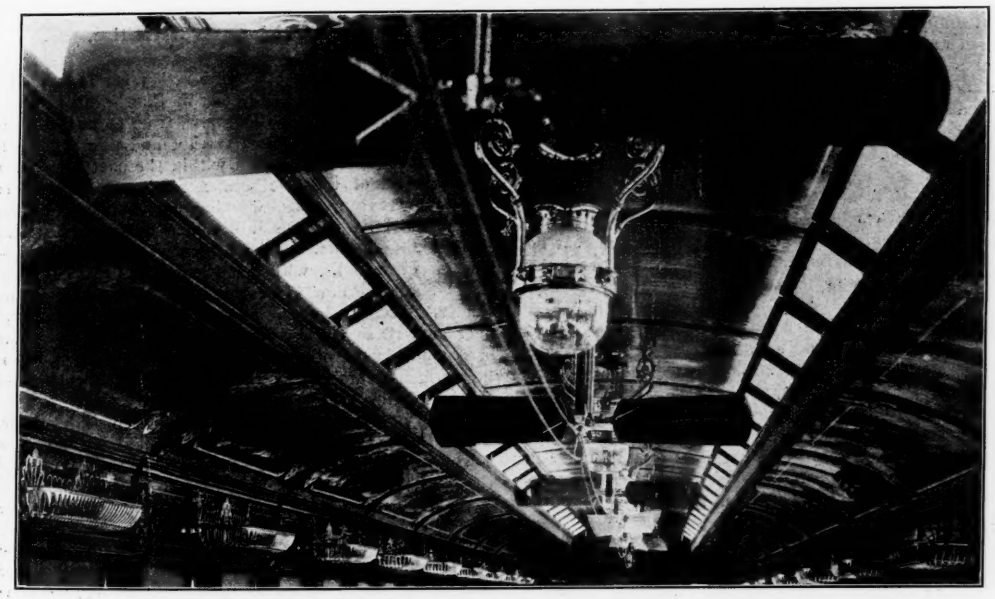
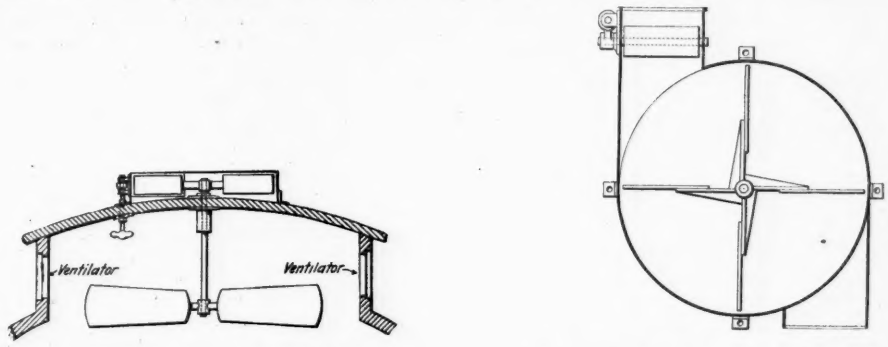


Fig. 1.—The American Car Ventilator—Philadelphia & Reading Railroad.

This apparatus was used last summer on two of the crack trains of the Reading, between Philadelphia and Atlantic City, and we are told that its performance was most satisfactory. It induced an active circulation, keeping the cars fresh and cool, and in smoking cars the effect is said to have been remarkable. These were easily kept free from smoke. Obviously a device that will accomplish this result will be especially welcome for the smoking compartments of Pullman cars and like equipment which are so shut in that they are hard to ventilate, and they are used by a kind of people who are apt to want fresh air, and to recognize it when they get it.

It is hardly necessary to say anything as to the general importance of ventilating cars. Everyone who has followed railroad matters intelligently is familiar with the steady stream of writing on the subject for the last 25 years or more, and knows of the various systems and devices that have been tried, and of the mechanical difficulties that must be met.



Section Through Clear Story and Case. *Plan of Case—Cover Removed.*

Fig. 2.—American Car Ventilator.

Railroad Employees' Relief.

BY J. A. ANDERSON.

This article is designed to give an account of the origin and formation of the Relief Department of the Pennsylvania Railroad, the principles on which it is based, and the results of 14 years' operation. As is well known the system of railroads and other works known under the general title of "The Pennsylvania Railroad" is made up of a large number of lines, originated under diverse names and ownership, now held in the name of a very few companies and owned or otherwise controlled by the Pennsylvania Railroad Company and operated under the direction of the general officers of that company. This general system divides into two at Pittsburgh and Erie, the lines east and west of these points having different executive officers. For convenience of designation the companies so united are here referred to as "The Company."

On January 1, 1900, the employees and officers on the eastern portion numbered about 75,000, while those west were about one-third of that number, making in round numbers about 100,000 men. At the usual estimate of five to the family, half a million of persons were, at the date named, directly connected with the fortunes of this corporation and interested in measures taken by it for their welfare. The number has since greatly increased.

The phenomenal success of the Pennsylvania Railroad has without doubt been largely owing to the traditional interest of the management in the welfare of the persons employed upon the company's works, as manifested in liberal contributions for reading rooms, libraries, places for refreshment and recreation, and for hospital service and other substantial aid for those injured in the company's service, as well as in rewarding long and faithful service by continued employment when practicable, when the time of greatest active usefulness has passed.

Actuated by this spirit, the attention of the company was early directed to providing some systematic plan of securing aid to those in the service whose injuries or other misfortunes appealed to the sympathies of the company or of fellow-employees, to take the place of the irregular and uncertain methods of dealing with individual cases as they arose, or of subscriptions in behalf of the sufferers. The employees were found to be very urgent in the desire for something of this kind, and upon the lines at present going to make up this extended system many local associations for mutual benefit were formed among them in the past, with the aid and encouragement of the officers in charge. In these, provision was usually made only for the event of death, although sometimes relief more or less definite, was supplied in case of permanent or prolonged disability.

The results with these early organizations were, however, in some respects, disappointing. They were very useful for a time and survived long enough to show the need of something more comprehensive and with elements of stability and permanence which they did not possess. It had become increasingly evident that the necessity existed for a more general arrangement, upon a substantial financial basis, and in 1875 an effort was made by the Board of Directors to secure something that should apply to employees on all the lines under the company's direction. This resulted in the preparation of a plan, which, however, did not meet with such general approval as to warrant proceeding with it, and the matter was for the time held in abeyance. In the year 1883, the subject was again taken up and placed in the hands of a committee of experienced officers, who presented a plan, which, after very full consideration, was adopted by the Board of Directors on Dec. 4, 1885, and went into effect Feb. 1, 1886.

In the consideration of a plan of "Relief" it was felt to be essential that, while sufficiently comprehensive in its general application to all employees, it must possess the features of assured permanence and of simplicity and flexibility in operation. The necessary simplicity rendered it inadmissible to embrace conditions based on differences in individual risks or looking to accumulation of reserve to provide for increase in those risks arising from increase in age of the contributors to the fund. The latter feature must of necessity be excluded on account of the frequent inevitable changes in so large a body of employees, and, instead, it was seen that upon these changes reliance must be placed for keeping up the

influx of younger members and thus maintaining or reducing the average age and risk as a means to permanence, viewing the whole body of members as practically one individual not increasing in age. The plan finally agreed on has, up to Jan. 1, 1900, been in successful operation fourteen years, with results eminently satisfactory.

Under the regulations adopted, it was arranged that every employee, in whatever branch of the service, should have the opportunity of being reliably assured of substantial aid when disabled from any cause, and of provision for those dependent on him in the event of death, through a fund created by monthly contributions of the employees, with certain substantial aid and full guarantees by the company.

The plan, in some details, is similar to the Friendly Societies on the railways of Great Britain, some features of which had already been engrafted into arrangements having a like purpose on this continent. This, however, has vital features distinguishing it from previous undertakings having similar objects, in—

1st. The constitution of a distinct department of the company's service for operating it;

2nd. The payment by the Company of the salaries of all persons engaged in operating it and of all other operating expenses; and

3rd. A guarantee by the Company which absolutely insures the payment of the proposed benefits and the solvency of the fund.

In the inception of the relief plan attention was specially directed to provision for the contingency of accident to employees while on duty in the service of the company. The line, however, between casualties of this character and other disablements is often quite indefinite, while a very brief investigation showed that the plan would fall far short of being satisfactory if it left the employee to seek elsewhere for protection as to sickness and natural death. To include these involved the assumption by the company, under its guarantee, of a very considerable and unknown risk, which, however, after careful consideration, it was deemed proper to undertake. The wisdom of this course has since been amply demonstrated.

The Relief Plan was introduced on the Western System in April, 1889, with regulations identical with those on the Eastern. Owing to changes since made, some differences in minor details now exist. The general features and the most of the details are, however, still the same, and the following recital, which includes some points already briefly referred to, will, in the main, apply to both.

The plan is operated as a distinct department of the service, each company represented in the Pennsylvania System having a separate Relief Fund and account, and paying its proper proportion of the expenses, but all united in operation, under a joint title.

Participation is voluntary and by employees only, and any one may withdraw on giving the prescribed notice.

Employees participating are termed "Members of the Relief Fund." Each signs an application in which he agrees to make the stipulated contributions and abide by the regulations, which are printed on the application and also attached to the certificate of membership which the member receives.

During the first six months all employees had the privilege of becoming participants without respect to age or physical condition. For applicants after that period physical examination was required and none were to be admitted who were over 45 years of age. There was originally a provision for a considerable period of service before an employee could participate. This period was subsequently reduced, and finally the provision was altogether eliminated.

Contribution is made by each member, in advance for each month, of a definite amount going to form a fund from which certain definite benefits become payable. The amounts to be contributed are fixed with some relation to the wages received, the members being in five classes, contributing as hereinafter stated, the benefits to which each is entitled being in proportion to his contribution. In order to secure economy in management, as well as simplicity, and in pursuance of the mutual idea, no account was taken, in fixing rates, of differences in age, within certain defined limits, or of relative risk. Simplicity is further secured by making a single contribution for each month cover title to all classes of benefits arising from membership alone, with, however, a further contribution by such as choose to apply for additional benefits on account of death.

For disablement by accident full benefits are paid for every day of disability up to 52 weeks, after which they are at half rates during inability to engage in employment. Benefits for sickness are paid at full rates for each day after the first three days (six on the Western system), for 52 weeks and, on the Eastern system, since January 1, 1900, half rates are paid after 52 weeks. The death benefit is payable to the beneficiary designated by the member in his application.

There are no entrance fees and no assessments other than the regular contributions and no change in the latter excepting on application by a member for change to another "class."

The "classes" which employees may enter are arranged according to wages, those in the first class contributing the smallest amount, the second class twice as much and so on to the fifth class, there being no distinction as to contribution in any class on account of age or special risk. An employee may enter a class lower than that which his wages entitle him to enter. The wages per month entitling to entrance to the different classes are as follows:

First class—Any rate.
Second class—Thirty-five dollars or more.
Third class—Fifty-five dollars or more.
Fourth class—Seventy-five dollars or more.
Fifth class—Ninety-five dollars or more.

The contributions per month are:

First class	$0.75
Second class	1.50
Third class	2.25
Fourth class	3.00
Fifth class	3.75

The benefits to which these contributions entitle members are:

	Sickness, per day.	Accident, per day.	Death.
First class	$0.40	$0.50	$250
Second class	0.80	1.00	500
Third class	1.20	1.50	750
Fourth class	1.60	2.00	1,000
Fifth class	2.00	2.50	1,250

"Additional Death Benefit" may be taken in sums of $250 to an amount not greater than the class death benefit, at rates varying somewhat according to the ages of applicants. For a member of the first class this admits of a total death benefit of $500, and for one of the fifth class of $2,500. The monthly rate for each additional death benefit of $250 is 30 cents, if taken by a person not over 45 years of age; if 45 and not over 60 the rate is 45 cents, and if over 60 years it is 60 cents.

Benefits for disablement are paid to members by cash orders on the Treasurer, sent to them through employing officers at the close of each month or more frequently for short periods of disablement. Death benefits are paid by voucher drawn in favor of the beneficiaries, which are equivalent to cash when properly receipted. Settlement is usually made within thirty days or less after death, depending somewhat on the time required for the identification of beneficiaries.

Soon after operations began, it was found that many old and deserving employees were disabled by sickness longer than the benefit period of 52 weeks. In such cases, where these persons were without adequate support, the company arranged to make further allowances at rates somewhat less than the benefits paid from the relief fund. These allowances were made by the company exclusively and did not come from the fund contributed by the employees. They ceased with the taking effect on Jan. 1, 1900, of the provision for benefits for sickness after 52 weeks.

The prompt and safe collection and transfer to the custody of the Treasurer of the large number of small contributions to be made each month is secured by means of the pay rolls. On these, with the pay due each member, is shown his Relief Fund contribution and the net amount of wages payable after this is deducted. This net amount is paid him and the amount of his contribution is placed at once, in his name, to the credit of the Relief Fund in the hands of the company's treasurer, who is also, by the regulations, the treasurer of the fund.

Besides celerity and safety, this method affords an important advantage in connection with the rule that contributions must be paid in advance for each month or part of a month to be covered. This is, that the moment a man in actual employment becomes a member he is entitled to the benefits of the Fund, for the reason that he has actually made his contribution in advance from the fact of his wages being liable for it, and thus a member is always "in benefit" when earning wages from which his contribution may be deducted.

Further, as each employee within the prescribed age limit is entitled to become a member, subject to physical examination, his membership begins at once on his signifying to his employing officer his wish to become a member, and from that moment he is entitled to the benefits of the Fund for the results of accident on duty and to those for sickness, after his right to membership is determined by his having passed a satisfactory physical examination.

The company takes care of and manages the Fund, paying interest on monthly balances, pays from its own treasury all salaries and operating expenses, and gives free use of office and transportation facilities. Contributions by members are used solely for the payment of benefits, with guarantees by the company of the payment of all benefits if contributions by members are not sufficient in either of the successive periods of three years each. Any surplus that may arise in any such period is to be used solely for the benefit of members of the Fund and not to pay liabilities for any other such period.

The Department is in charge of a Superintendent, who, subject to the General Manager of the company, directs its operations and employs the persons engaged in them.

There is an Assistant Superintendent authorized to act for the Superintendent as he may direct, or in his absence, and a Chief Medical Examiner stationed at the office of the Superintendent as his adviser and assistant in medical matters.

Medical Examiners are stationed at suitable points who are employed to devote themselves exclusively to the duties of the Department, which include examination of applicants for membership and examining and reporting on members reported sick or injured.

The Medical Examiners are educated physicians, selected on full examination as to their qualifications, by a competent board of medical men already experienced in the work of the Department.

They report daily to the Superintendent on cases of disablement and death of members. These reports, after examination and record, form the basis on which benefits are paid. This system secures the Fund, as far as practicable, against improper or fraudulent claims, and also guards against members failing to receive benefits to which they are entitled. The salaries of the Medical Examiners form a large part of the operating expenses paid by the company.

There is an Advisory Committee, to whom appeal may be made from decisions of the Superintendent of the Department, consisting of equal numbers of members chosen by the Board of Directors of the road and by the members of the fund, with the General Manager as member and chairman. This Committee meets quarterly to consider the conditions of the Fund as reported by the Superintendent, who is also Secretary of the Committee, and questions that arise respecting the management of the Department, as well as proposed changes in the regulations.

No changes can be made in the Regulations except on adoption by the Advisory Committee and approval by the Board of Directors of the company.

The annual election, by the contributing members, of persons to represent them on the Advisory Committee is an important feature. Blank ballots, addressed individually to all members, are distributed through the employing officers. On these are shown the By-laws relating to the elections and instructions as to the manner of voting. Nominations previously made and sent in through the members of the Committee, are announced by handbills, a copy of which on a smaller slip is enclosed with each ballot. The voter is, however, not limited in his choice to these, but may vote for any member in his voting district. Much interest is taken in these elections, the vote generally being about 70 per cent. of the membership. The ballots are returned by mail or train to the Superintendent of the Department, who delivers them to tellers designated by the Committee. These count the ballots at the appointed time and declare the result, under oath, to the General Manager, who announces it by printed notice.

Although in the Advisory Committee there is, including the General Manager, who is Chairman, a preponderance of members who may be said to represent the company, over those representing the contributing employee, all questions have been determined with great harmony and in the largest spirit, and without reference to such distinction, showing the desire of all to promote the interests of the contributors to the greatest practicable extent. All the members of the committee are in fact themselves members and contributors, as are the officers of the company generally.

(To be continued.)

The South Carolina 1901 Exposition.

The "South Carolina Interstate and West Indian Exposition," to be opened in the city of Charleston on Dec. 1, 1901, is worthy of attention, now, from manufacturers and those looking for a new market and new fields for enterprise. The consolidation within the past few years of nearly all of the Southern Atlantic coast railroads into four great systems, working harmoniously, makes new industrial conditions in North and South Carolina, Georgia and Florida. In 1890 there were in South Carolina 34 cotton mills, with 8,456 looms and 332,784 spindles. There are now 111 cotton mills, with 60,168 looms and 2,122,205 spindles, and these are making the finer as well as the coarser fabrics. Like progress has been made in the other coast states and in other manufactures, and apparently the opportunities for business enterprises are greater than ever before.

A map of Charleston harbor, and of the peninsula on which the city is built, shows lines singularly like New York harbor and Manhattan Island, with the Ashley and Cooper rivers corresponding to the North and East rivers that bound Manhattan Island, and the exposition grounds in Charleston corresponding in location to Central Park in New York, except that the exposition grounds have a long frontage on the Ashley River. This river has a 40-ft. deep channel extending down through the harbor to the outer bar. Over the bar there is now a clearance of 30 ft., which is being protected and deepened by a system of jetties built by the general government. The bar is seven miles out from the city, and the harbor is quite comparable with that of New York. The Charleston people believe, and seem to have reason to believe, that their trade with the West Indies will be of great importance because of their nearness, their harbor, their railroad development and the consequent rapid increase of manufacturing. The manufacturers of cotton now include the finer kinds, and the quality is second only to that made in Massachusetts. The mining and manufacture of phosphates and sulphuric acid is an increasing industry in which over $2,000,000 is already invested along the Ashley River.

The exposition tract includes 230 acres, of irregular outline, with a long frontage on the Ashley River fringed with magnificent live oak trees, which give a natural "local color," and a grateful shade whose enormous capacity is indicated by the spread of the branches of the largest one, 155 ft. The architect is Mr. Bradford L. Gilbert, who had charge of the Atlanta Exposition. He is provided with a fund of $350,000, which should be sufficient for the buildings and improvement of the grounds, because the topography lends itself so naturally and economically to his plans.

There will be an inland lake, of about 30 acres, with an electrical island, and in the surrounding live oak forest will be placed the State and United States Government buildings. The display of industries will be on a

flat plain, more than half a mile long, with an auditorium, for 6,000 people, at one end and the Cotton Palace at the other end. The sides of the plaza are to be lined by the commerce and agriculture structures.

The bill appropriating $250,000 for a government exhibit has been passed by the United States Senate, and there seems to be little doubt of appropriations by many of the states. The exposition idea is good. It is a dignified and effective way of showing the work of a people and the opportunities for enterprise in a region. For South Carolina and for its principal city it is especially timely now, as it has at last fully awakened from the results of the Civil War and the "reconstruction" period. The city itself is so rich in undisturbed historical landmarks, extending back through the Civil War and the Revolution to the colonial settlement, that it will of itself be a most interesting exhibit to visitors at the exposition.

The Lighting of Trains.

Question 22 of the International Railroad Congress was on the lighting of trains. The first part of the report is by MM. Chaperon and Herard, who are connected with the Paris, Lyons & Mediterranean and with the Orleans railroads respectively. These gentlemen report on all countries except Austria-Hungary, Roumania, Holland, Luxemburg and Germany.

The report takes up first the history of oil lighting and describes the various improvements. This, of course, deals with the early use of vegetable oils and with the use of petroleum later. It is hardly worth while to reprint any of the details given by the reporters, as this method of train lighting exists only by sufferance and is bound to disappear before many years.

Compressed Gas.—The next division of the subject deals with lighting by compressed gas and describes in some detail the methods of manufacture and the car equipment. With all of this our readers are familiar and it is not necessary for us to reprint any of this part of the report. Incidentally, it may be interesting to know that trials of incandescent mantels have failed because these could not stand the rough usage of car service which is what one would expect. The reporters say that in 1898 there were 105,850 cars and engines lighted with gas. Obviously, this number has largely increased since that time, for India and New Zealand have taken up Pintsch gas extensively and the number of cars equipped has increased steadily in the United States. The locomotive headlights burning compressed gas are found only on the Continent of Europe, where we believe some 4,000 are in use, although the reporters do not give particulars of this.

Acetylene Gas.—In 1895, at the London session of the Congress, the question of the possible use of acetylene gas for train lighting was brought up. This gas was little known at that time and its use was very restricted. In 1896 several railroad companies made unimportant experiments with compressed acetylene gas stored on the cars. The apparatus was devised to generate the gas in place, the gas compressing itself as it was generated, without any pump or other compressing apparatus. The light was excellent, but the burners developed the inconvenience of becoming obstructed by the carbon deposited in the decomposition of the acetylene under heat. Furthermore, the experiment showed that there was considerable danger in dealing with compressed acetylene. The gas is readily disassociated, under pressure, by heat and sufficient heat may be generated by the action of the water on the carbide of calcium. It happened therefore that if this disassociation took place in the generating apparatus it might be carried to the reservoir storing the gas and an explosion could happen. Because of these dangers and as the result of accidents with liquid and compressed acetylene the idea of using this gas for car lighting was generally abandoned. Later experiments have given rise to the notion that it may be possible to store acetylene gas in some very porous body and thus avoid some of the dangers.

Acetylene and Oil Gas Mixed.—In 1896 the Pintsch Company made a series of very interesting experiments on mixtures of acetylene gas and oil gas. These experiments were designed to test the explosibility of the mixture as well as its lighting qualities. It was found that this mixed gas did not readily explode provided the proportion of acetylene did not exceed 45 per cent. It followed that the first advantage would be the use of a mixture without modifying the compressing apparatus or any of the car equipment; furthermore, that the difficulty of quickly fouling the tips with carbon deposited was diminished. This mode of lighting was first used in Berlin in 1897 in local service, 25 per cent. of acetylene gas being used. Since then several companies have taken it up. With 25 per cent. of acetylene the illuminating power is trebled. The larger proportion of acetylene gives still higher illuminating power, but this does not increase as fast as the quantity of acetylene introduced is increased. We judge that this use of acetylene has no great applicability in the United States as the compressed oil gas made here is quite superior in quality to that ordinarily found on the Continent.

Storage Battery Lighting.—In 1880 the question of lighting by storage batteries came up. Several companies made experiments along this line and the reporters say that 3,500 cars are now so lighted. This includes only 74 cars so lighted in the United States; but we should guess that the Chesapeake & Ohio has more than this. In fact, one great defect in this report is the lack of specific information. In spite of the obvious advantages of electric lighting by storage battery, and although the trials have now extended over a dozen years, this system has not been developed as much as might have been expected. Several companies which have tried it have abandoned it for gas lighting. Generally, it appears to be true that the charging of the accumulators is troublesome and expensive, particularly where a great number of cars are in service or where the service is extended over a large system. Recharging the batteries in place on the cars is obviously impracticable except under certain quite restricted conditions, as it takes the cars so long out of service and requires so much yard room. On the other hand, changing the cells in and out has several objections, as, for instance, the amount of labor required and the injury to the cells in repeated handling.

Axle Lighting.—In 1885 an experiment was made in generating electricity by a generator driven from the axle using auxiliary storage batteries. The installation was very rudimentary and bad results were obtained. Since that time, however, extensive experiments have been made. The Stone system is described in some detail, but with this our readers are already quite familiar.

In 1897 Mr. Auvert, Engineer of the Paris, Lyons & Mediterranean, began developing an axle-lighting system differing radically from the Stone system in that the control is in the electrical apparatus itself and not by slipping the belt, as is the practice in the Stone system. This Auvert system has also a pole changing device, making the current independent of the direction of movement of the car. This system employs storage batteries also, which weigh about 4,500 lbs. for each car, and the storage will light the car for eight or nine hours. It is said that this system has been very satisfactory, the regulation working perfectly, and the company has decided to put this method of lighting on 50 cars now building.

In the Dick system a dynamo is placed under a van, taking power from the axle as in the Stone and Auvert systems, but using a tooth gear. In the van is the necessary regulating apparatus. Each car of the train carries a battery of accumulators, as does also the van. During the day these accumulator cells are charged. At night, when the lights are burning, the current from the dynamo is not sufficient, but the storage batteries supply the deficiency. By this system the cars must be run far enough during the day to charge the batteries. The reporters say that this is employed on some cars of the Cape railroads, and also in America, although we do not know where it is used in the United States. An obvious defect of this system is that it is seldom convenient to keep the cars of a train together.

The reporters do not inform us how many cars are now in use with axle-lighting apparatus. The tabulation simply mentions "several cars in United States" or "applied to a few trains," and in that table the United States is credited with no axle-lighted cars, which, of course, everybody knows, is a mistake, as the Atchison has long run 75 to 100 cars so lighted and a number of roads have had under trial at least two or three cars.

Conclusions.—The reporters conclude that lighting with oil is cheap, so far as the installation goes, but requires a considerable expense for attendance. Furthermore, the lamps need great care in order to get good results. As a consequence the cost per lamp hour is not low.

For gas lighting the original outlay for manufacture and distribution is considerable. There must be considerable storage capacity and the distribution throughout the stations involves considerable piping. The car equipment is necessarily more expensive than for oil lighting and the weight of this equipment should be taken into consideration. Notwithstanding all this, however, a great number of companies have not hesitated to adopt this method of lighting, the advantages of which are found in the quality of the light, the facility of modifying the intensity of the light, the simplicity of the service and maintenance and the ease of recharging the reservoirs. The cost of attendants is reduced to a minimum. The amount of light can be easily increased by the use of lamps with several burners, and also the heat of the burning gas can be utilized to promote ventilation.

Electric lighting, however, is beyond a doubt the most attractive method. Incandescent electric lamps have an unquestioned superiority over anything else for car lighting, whether it be from the point of view of the comfort, of the facility of distributing the lamps where they are most wanted or the ease of increasing the amount of light. The electric lamps make little heat and there is no question of getting rid of products of combustion. When storage batteries are used the installation is simple and not excessively costly, and while the batteries are in good condition this method of lighting leaves nothing to desire. The charging of the batteries and their maintenance is, however, difficult and costly, as has been pointed out above.

Lighting the cars by current produced by dynamo from an axle realizes in principle a lighting system at once complete and rational. Although a considerable number of companies have made trials of this method it is not possible yet to pronounce definitely on the value of the system. As matters stand to-day the regulation seems to be complete, but will the apparatus serving to assure this steady current at the lamp be durable? Will the cost of maintenance of the apparatus be excessive? Will the necessity for careful inspection of the generating apparatus become burdensome? The reporters say that these things the future must decide.

The Car Journal Bearing and Hot Boxes.*

It is desired to call attention to a condition well known yet lightly regarded, which cannot fail in many instances to produce a hot box. Take, for example, the M. C. B. standard 60,000 lbs. capacity journal and bearing. The former has a diameter of 4¼ in. while that of the bearing is a trifle greater. The bearing has a lining or filling of lead or soft composition metal, so that when put together in service, all things being as they should, the bearing very soon adjusts itself to the journal. But as the journal continues in service it wears until it reaches the limit of 3¾ in., so that it is not far out of the way to say that the average journal under 60,000 lbs. capacity cars is 4 in. in diameter. But during the life of the journal many bearings are applied to it, and usually it is the standard bearing intended properly for a journal 4¼ in. diameter. Thus a considerable difference exists in the radii of surfaces that should be nearly alike, and this difference grows constantly greater as the wear of the journal continues. The result of such difference is illustrated in Fig. 1.

While it is expected, and is sometimes the case, that by reason of the soft metal filling, the bearing will gradually adjust itself to the journal, yet, when we consider the very small bearing area that we must have for some time, and the resultant intensity of pressure per unit of area, it is reasonable to expect that hot boxes will frequently result, and as a matter of fact do, when new bearings are applied. Think of these conditions in fast passenger service. Not only is the adjusting of the bearing to the journal in itself an operation likely to give trouble, but in addition, as the adjustment progresses, the journal box, key and bearing move downward with relation to the axle, with the consequent tendency of dropping the packing away from the under side of the journal and thus cutting off the supply of the lubricant. It is hardly possible in practice to provide satisfactory relations between the worn journal and a new bearing from the beginning, but the writer presents a plan as shown by Figs. 2 and 3, which has been found a decided improvement.

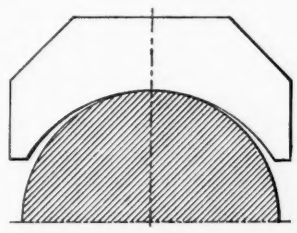


Fig. 1.—Outline of New M. C. B. Brass and Worn Journal.

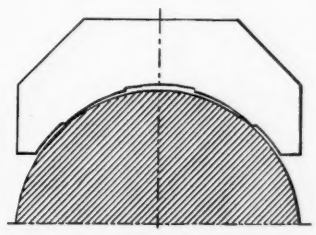


Fig. 2.—Outline of Mr. Bush's Modified Brass With New Journal.

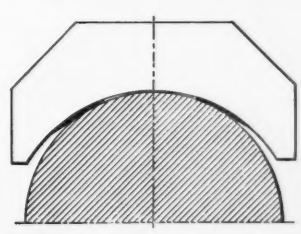


Fig. 3.—Outline of Mr. Bush's Modified Brass With Worn Journal.

The inner surface of the bearing is provided with a raised strip on either side of the center line and parallel with it. These strips are from ⅝ to ¾ in. wide and directly under the edges of the flat horizontal surfaces of the key and bearing, so that there is little tendency to spread the brass. They are raised above the inner surface enough only to provide these lines of contact between the bearing and journal when the latter is worn to 3¾ in., as per Fig. 3. This gives two lines of contact when the journal is full sized, as shown by Fig. 2. Engine truck journal bearings on a similar principle have been used for years with great success. Besides providing a better adjustment more rapidly, a further advantage is gained in preventing so much movement of the axle in the bearing at right angles to its axis, such as may be caused by an application of the brake, or in passing around curves, so that the axles are more apt to be maintained parallel with each other. As a better contact between journal and bearing is provided from the beginning, the tendency for the packing to drop away from the under side of journal is also reduced, and it will thus be seen that the opportunities for hot boxes are lessened.

A well known iron works in Nuremberg, Spaeth & Co., which built the first railroad car run in Germany, and now builds bridges and makes various railroad supplies, has been looking into its history and has published a little book about it, by which it appears that it began operations as long ago as 1337. (The first "3" is not a misprint for 8.)

*Extracts from a paper read before the Western Railway Club, by Mr. S. P. Bush, Superintendent of Motive Power, Chicago, Milwaukee & St. Paul.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Railroad gross earnings for November, covering 102,397 miles, according to *The Chronicle*, show a gain of $1,292,000, which is a fraction over 2 per cent., or somewhat less than the mileage increase, which was a little over 3½ per cent. This follows gains of $5,923,000 in 1899, $2,187,000 in 1898, and $8,981,000 in 1897, and is made in the face of the failure of the spring wheat crop in the Northwest. Of the 111 roads reporting, 22 show increases of over $30,000 and 16 show like decreases. The Baltimore & Ohio leads in gains with $381,000. Then follow the Illinois Central with $288,000; the Choctaw, Oklahoma & Gulf, $228,000; the Missouri, Kansas & Texas, $220,000, and the St. Louis Southwestern, $205,000. The Canadian Pacific has the largest decrease, $310,000. Other large losses are the Chicago, Milwaukee & St. Paul, $235,000, and the Great Northern system, $231,000. Receipts of wheat, corn, oats, barley and rye at the primary western markets for the four weeks ended Dec. 1 were only 48 million bushels, against 54 million bushels in the corresponding period of 1899. Chicago during the 30 days of November, 1900, received only about 15½ million bushels of grain against nearly 20 million bushels in 1899 and almost 26 million bushels in 1898. Deliveries of live stock at Chicago comprised 26,238 carloads, against 24,412 carloads last year and 24,678 in 1898. There was a slight improvement in the cotton movement in the South. The receipts at the southern outports were 1,159,963 bales in 1900, against 1,057,083 bales in 1899, but against 1,747,822 bales in 1898. Overland shipments were 383,540 bales this year, against 337,112 bales a year ago. Considering the roads by groups, the heaviest relative gains were in the nine roads of the Southwestern group, rising from $8,631,000 in 1899, to $9,441,000 this year. This was due to the fact that the cotton crop of Texas and the Southwest generally has been better this year than it was last season. The only group to show decreases is the Northwestern and North Pacific (12 roads), whose gross receipts dropped from $15,965,000 last year to $14,659,000 in 1900. This was due, as already stated, to the failure of the wheat crop. Wheat receipts in Duluth alone fell from above 7½ million bushels to less than 3 million bushels this year.

The acquirement of the Pennsylvania Coal Company's property by the Morgan interests is generally conceded to have put an end to the movement for an independent coal railroad to the Atlantic seaboard. The road was projected about a year ago under the title of the Delaware Valley & Kingston, to run from Hawley, Pa., east 96 miles along the old canal bed of the Delaware & Hudson to tidewater connection on the Hudson River at Rondout, N. Y. The right of way along the canal bed was acquired, by interests promoting the new road, from the Delaware & Hudson when that company abandoned its use of the canal and it was proposed to use the Erie & Wyoming Valley line from Hawley into Scranton. This road is owned by the Pennsylvania Coal Company, which was also the chief promoter of the new line. Surveys were made and in May last permission was obtained from the New York State Railroad Commission to build the line. The Erie had already begun opposition in the courts. A suit in equity was filed in March against the Erie & Wyoming Valley and the Pennsylvania Coal Company to prevent the building of the road, on the ground that the Pennsylvania Coal Company already had an agreement with the Erie which was to run until Dec. 31, 1909, whereby the Erie was transporting the Coal Company's coal, and the new road would interfere with this agreement. Application was made in May by the New York, Ontario & Western to the Appellate Division of the Supreme Court of New York for a writ of certiorari, which resulted in a stay of all proceedings. Meanwhile the New York, Ontario & Western took steps to build a road that should parallel the line at its eastern end. This opposition, however, received a check in September last, when the Appellate Division handed down a decision indorsing the action of the State Railroad Commission in granting permission to build the line. This was a sweeping victory for the new Delaware Valley & Kingston and that company publicly announced its intention to go forward with the work as soon as the Pennsylvania courts rendered a decision on matters pending in that State. But another way has been found to kill the project, by buying out the owners. Should the road be built under the new ownership, which is extremely doubtful, it will be in harmony with the leading coal roads. We judge that this is a fortunate outcome; it not only protects great vested interests, but it will probably serve the public better in the end.

Brown's Discipline.

There can be no question that the abolition of suspensions on American railroads has been a great success. This can be said in the face of the fact that prominent roads, after inquiry, have decided not to change from their former methods, and that a few superintendents, after trying Mr. Brown's plan, have abandoned it. It remains true that a considerable number of large roads have now had the new plan in force for several years, and that, on those roads, the division superintendents, who do not like the plan, if there be any, are so few that nothing is heard from them. In this issue we give the substance of a discussion on this subject which was had in the Rocky Mountain Railroad Club at its October meeting. This discussion was very one-sided, and evidence which we have from other sources is even stronger in favor of "suspending suspensions," than that given by the speakers at Denver.

The essential features of "Record Discipline" are so rational, appealing to everyone's sense of justice, that it is perhaps not to be wondered at that every opinion expressed about it is a favorable one. Even those few who privately express some mild dissent, say that their view is based largely on "the hardness of men's hearts," as was the Mosaic toleration of easy divorce; if we only had more intelligent and reasonable employees the plan, they say, would be all right. This objection would seem to be partly if not entirely answered by the fact that superintendents in the Southwest, where it is supposed to be most difficult to get good men, are among the most enthusiastic advocates of the new plan.

A chief reason why so many railroad officers have been convinced that suspensions are wrong, is to be found, no doubt, in the inherent illogical nature of the practice. In suspending a man the company punishes itself directly, for the purpose of punishing the man somewhat indirectly. If the man is going to be again entrusted with his responsibilities, what advantage is to be secured by laying him off for 30 days? Quite likely the lesson of his error can be impressed on his mind in one day as well as in 30 days; and if the infliction of a money loss is the main object why not impose a fine and let the man go to work? Fines are universally deprecated, and their general imposition would, no doubt, precipitate a fight with all the brotherhoods; but what brotherhood leader can show a reason for considering fines any worse than suspensions? To enforce your right to loaf 10 days because the company fines you $40, is usually an empty victory; as empty as is that of the company when it punishes itself by putting an inexperienced man temporarily in your place for the sake of showing that it disapproves of something you have done.

Speaking of the railroad world in general, the following of Mr. Brown's example has produced a widespread improvement, worthy of especial notice, if we mention nothing but the introduction of individual records where formerly no such records were kept. This alone has, no doubt, prevented countless minor cases of injustice. Records are now kept on some roads where suspensions are still in vogue. Besides thus enabling a superintendent to more readily and surely maintain uniformity in his dealings with his own men, the records have made it possible for the five, ten or more division superintendents of a large road to maintain consistency throughout the system. This, no doubt, prevents much friction with the men, though in the nature of the case this advantage cannot always be definitely measured.

This establishment of records is a very practical matter, without regard to how much thought the superintendent gives to the abstract ethical arguments which are usually cited in opposition to suspensions. Another practical matter with many roads is the reduction of the size of the extra list. With some roads this argument has no weight. With good men and a steady traffic they get along with but few extra men. The road which has half as many extra as regular men may be said to be the victim of poor management, needing to be reformed; but we cannot deny that these roads have found, after some years of trial, that the abolition of suspensions is a satisfactory way of effecting the reform.

The resumption of suspensions where "record discipline" has been in force for a time, has in three cases been immediately due, apparently, to a desire to have the practice uniform throughout the whole of a company's lines. One division has tried the new plan; the other divisions are not convinced of the advisability of making a change, and the one superintendent has to yield to the majority. In another case a radical change in the personnel of the management was the cause. In none of these cases do we find well-defined objections. The one objection which has been defined, and the only one, so far as we know, is that some men, otherwise fit to be retained in the service, have such dull consciences or such an inadequate sense of duty that nothing but a money loss will induce them to learn the lesson of a blunder. Talking to them seems to have no satisfactory effect. This we have from a superintendent who does not suspend; but who seems to wish, in many cases, that he could. As we do not know his men individually it is out of the question for us to answer his point, practically; but from a theoretical standpoint it seems to us that the answer is quite plain; such conscienceless or senseless persons should be got rid of. We are quite aware that it might take years to do this, but is not the remedy rational? To suspend men pending the investigation of their misconduct (which is done everywhere) affords a means of inflicting a mild punishment on those whose consciences appear to be tough. An investigation taking a week deprives such a man of from $15 to $30 or more, and if a penalty of that size does not sober him he certainly ought to be a hopeful candidate for final dismissal.

Those superintendents who are most enthusiastic in their praise of "record discipline" base their view not on one or a few advantages, but on all those mentioned at Denver, and others besides. On one large Western road the cases of minor negligence have been reduced in number 90 per cent. That is no small achievement. This class of cases embraces many things which, if actual suspension were the regular punishment, would go unpunished, because the superintendent would be reluctant to multiply small cases; and yet the punishment is deserved. That men appreciate the meaning of a record is constantly evidenced by offers from one and another to pay money losses incurred by their negligence, so as to preserve a clear record. Men show their appreciation also by the way in which they value the "merits" that they get. One conductor who had long had an excellent unwritten record, on receiving for the first time a letter from the superintendent saying that the writer took pleasure in apprising him that his services had been satisfactory for twelve months, remarked to his wife that that was the first time in twenty years that he had had any information from the company as to the quality of his work, one way or the other; and that the long suspense had been felt by the wife as well as by the man himself is shown by the fact that she promptly had the letter framed and hung in the parlor. In these days, when every manager is fostering the Young Men's Christian Association for the good which it does for trainmen when they are away from home, no one can say that measures for promoting men's happiness at home, in ways like that illustrated by this incident, are beneath attention.

This brings us to what Mr. Dyer, in his Denver essay, mentioned as the first attractive feature in record discipline, the rewards for meritorious service.

Punishments are or should be the abnormal or exceptional elements in dealing with employees. Good work, not blunders, is the everyday, commonplace feature. Merits should be as much more prominent than demerits, as the pay car is more noticeable than the blue envelope. And yet, the granting of credits is a point on which different superintendents differ most widely. One marks credits every three months and allows careful men to pile up records which would obliterate a dozen grave blunders. Another gives credits where there have been debits, but does not allow accumulations beforehand; does not believe that a man's record should "go above par." A third gives no credits at all, deeming the absence of demerits a sufficient assurance to the employee that his work is satisfactory. Some roads allow a short period of good work to wipe out a debit charge, while others require three or four times as long. But we are glad to see that these differences are recognized as being matters of detail and are not allowed to interfere with the main purpose. They can be satisfactorily adjusted and righted with little difficulty if they are not allowed to be neglected.

The main purpose of discipline, "record" or any other, is to secure good work and to keep the workmen cheerful; and nothing is too small to deserve attention if it will help in the accomplishment of this purpose.

Belgian Railroads in 1898.

The report of the Belgian railroads for 1898 shows 2,493 miles of State railroads and 383 of company railroads; the State system having been enlarged by 418 miles over the previous year by the acquisition of the principal private railroad in the Kingdom. Of the State railroads 908 miles, or 36 per cent., was double track road. The State system represented a capital of $140,888 per mile of road, more than one-fifth of which had gone for rolling stock.

The traffic on the State system was equivalent to the movement of 761 passengers and 1,035 tons of freight each way daily, which may be compared with 107 passengers and 903 tons on the railroads of the United States in 1898-99; with the 332 passengers and 727 tons on the New England railroads, and with the 260 passengers and 2,195 tons in "trunk line territory" (between New England and Ohio). Five years ago, when the New York Central was working nearly the same mileage as that of the Belgian State Railroads in 1898, its freight traffic was three-fourths greater than theirs, but its passenger traffic little more than half as great. Belgium, be it remembered, has about 2,130 inhabitants per mile of railroad.

The train movement on the Belgian State roads was at the average rate of 10.08 passenger trains and 7.25 freight trains each way daily. The passenger trains, however, though more than a third more numerous, earned but little more than half as much as the freight trains. The average passenger journey was 13.6 miles. The average train loads were 74 passengers and 143 tons of freight, with an average of 7.8 cars in a passenger train and 26.43 in a freight train.

Of the passenger miles 4.8 per cent. was first-class, 15.4 second-class and 79.8 third-class, but the first-class yielded 11.9 per cent. of the passenger earnings; the second-class 25.4 and the third-class 62.7 per cent.

The average passenger rate for all classes was 0.834 cent per mile—just five-sixths of a cent. But the average for the third-class, four-fifths of the whole, was 0.66 cent; of the second, 1.37; and of the first-class, 2.06 cents. Not one-sixth of the journeys were made on simple one-way tickets, more than a third on round-trip tickets, and one-half on commutation, workmen's and school tickets at reduced rates. Though the average passenger train load is large (74, against 41 in the whole United States, and 58 in New England), the average passenger train earnings are very small (71 cents, against $1.02 here); and the profit from it must be very slight. The average receipt per freight-train mile, on the other hand, is $1.71 in Belgium, and the average receipt per ton per mile approximately 1.20 cents. The average haul of freight is not ascertainable from the report, but it must be very short, the country being smaller than the state of Maryland, and a great deal more compact, and the traffic consisting largely of coal and ore hauled short distances to blast furnaces, etc.

Taking trains of all kinds together, the average per train-mile was: Earnings, $1.13; expenses, 0.67; net 0.46.

Per mile of road the earnings were $15,313 gross and $6,196 net; the latter being 4.1 per cent. on the capital invested. The number of employees was 58,157, or 23⅓ per mile of road (here, 4.95 per mile).

The corporation railroads in Belgium are now so small a portion of the whole (383 miles out of 2,876), that the report for the State system represents the average railroad condition much better than formerly. The data given for the private railroads are quite incomplete. They earned on the average $12,487 gross and $7,043 net per mile and $1.29 gross and 73 cents net per train mile. Only one-third of their train mileage was of freight trains, which yielded nearly two-thirds of the earnings. The employees were at the rate of 14¾ per mile of road.

There is a very considerable mileage of light railroad in Belgium not covered by either of these reports, and not subject to all the general regulations governing the railroad system.

The "gentle reader" will have noted that a train was robbed the other night within the city limits of New Orleans, a fact which ought to make every citizen of New Orleans and of Louisiana ashamed of himself and of his city and his state. It makes us ashamed of them. As we have often said, such a crime is impossible in a civilized country; it would be unthinkable in England or France or Germany, or Austria, or even in Russia. It appears, however, that it is not the fault of the civil government or of local public opinion that trains can be stopped and robbed in the United States, but that it is the fault of railroad officers in general, and of enginemen and firemen in particular, as is clearly shown in the following powerful article from the editorial page of the New York *Tribune*:

> When an important limited express is plundered within the city limits of New Orleans managers should bestir themselves. Would it not be advisable to arm the engineers and all train-hands with quick action revolvers of the latest pattern, and to instruct them to keep their eyes open against ambushes of every kind? Why is it that engineers and firemen are not more vigilant? Why do they not watch the tenders and the dark lurking places on the curves of the tracks more closely? Some suspicious persons might be inclined to doubt the absolute integrity of engineers and firemen who permit themselves to collapse so completely when a highwayman comes in sight on the tender or at the side of the rails. A Gatling gun or a park of artillery might properly frighten a locomotive engineer into putting on the air-brakes and retiring from his post of duty, but if his hand is at the throttle, if his sight is keen, he is usually a coward, or even worse, if at the first sign of peril he checks his train and gives it over to thieves. But whether or not there is a corrupt understanding with train robbers, or it may be only cowardice which has enabled thieves to loot trains so freely, it is the pressing obligation of certain railroads to do more than they have been doing to protect the property committed to their care.

Here breathes the true spirit of devotion to duty; this is the sort of chap who used to die for his king or his ladye with a gay smile on his lips and a sword four feet long in his hands. This bold youth of the *Tribune* asks no police or magistrates to take care of him; no, no. We can see him boldly stalking across City Hall Park with his week's pay in his pocket and that proud spirit in his breast. Would any galoot with a sandbag or a pom-pom get that twelve dollars and a half away from him? We judge not. Why can't enginemen and other greasy railroaders be bold and true, like him?

A German official who recently accompanied an agent of the Japanese Government from Berlin to Japan by way of the Siberian Railroad has written an account of the trip. The regular time of trains and steamers requires 28½ days from Berlin to Tokio, but the unavoidable delays make it unsafe to reckon on less than 30. The speed of the express train decreases the further east you go. From Berlin to Alexandrovo (Russian border) it is 46 miles an hour, thence to Moscow, 26; from Moscow to Cheliabinsk (Siberian border), 22; thence to the Obi, 19½; from the Obi to Irkutsk, 15; from Lake Baikal to Stretensk, where the Amoor steamboats are taken, 10. But this time-table speed is never maintained, and the express from Moscow often gets into Irkutsk 12 hours late. On the last section, beyond Lake Baikal, this traveler's train was 36 hours late. It must be remembered that this part has not been formally opened for traffic, though it has carried a great deal, especially since the troubles in China. Aside from a want of cleanliness and the Russians' habit of stretching themselves at full length in the cars, the journey on the Siberian Railroad is comfortable. The passenger can move freely on the car platforms, or even sit on the steps and observe the people and the country. The Trans-Baikal section, however, has a train only twice a week, and these trains are composed of freight cars with rough benches and some fourth-class passenger cars. These cars are overcrowded, and the trains carry as many as 1,400 passengers each. Nineteen-twentieths of them are emigrants going to the Amoor valley with families and household goods, and they fairly fight for a place in the train; as if they get none they must wait three or four days for the next one. The journey from Berlin to Tokio, made as comfortable as possible with stops at the notable places on the way, costs $240; made without stopping, $192, which is cheaper than in any other way.

The London & North Western Railway of England has been giving out some statistics showing that for the past 12 months its 36 daily express trains between London and Birmingham, Liverpool and Manchester have arrived at their respective destinations only 3½ minutes late, on the average. This statement, which we take from *Transport*, appears to have been published with the view of answering the critics who complain of the unpunctuality of passenger trains and who allege that the evil is constantly growing worse. So far as we have observed, these complaints do not single out the London & North Western, or any other particular line; nearly or quite all of the great railroads are condemned together. The same statement gives some account of the increase in the accommodations for passengers during the past few years. The London & North Western a few years ago had only four trains on which dining cars were run; in 1896 there were 15 such trains, while now there are no less than 35. The dining car and its costly service is enough of an annoyance here in America, but in England the troubles of the railroad superintendent from this source go one degree worse; he has to provide eating accommodations for two or three different classes of passengers, and, we believe, at different rates. The sleeping car service has also been greatly increased. There are now 26 separate services every night (except Sunday) on the London & North Western. This number includes, we suppose, all of the trains, in both directions, throughout the company's lines from London to Manchester, Liverpool, Scotland and Ireland.

The Railroad Commissioners of Maine have made a report on the draw-bridge disaster which happened on the York Harbor & Beach Railroad, April 30 last. This road is operated by the Boston & Maine. A mixed train, having just crossed a drawbridge, and while ascending a steep grade, became stalled; and six cars, including a passenger car, ran back and fell into the river, the draw having been opened after the passage of the train. No one was killed, and only two persons were injured. When the train was obliged to stop, 10 cars were cut off and were left standing on the main track. The rear six of these cars soon began to run backward, having broken away from the forward four, and though the brake on the passenger car was set the cars ran to the end of the track and two of them fell to the water below. The draw had been nearly closed. The 10 cars had been left with three brakes to hold them, two on the two forward cars and one on the rear car. The Commissioners say that it would seem as if the brakes on the rear car ought alone to have held the six cars. The coupler which separated was of the Gould pattern and no defect was found in it; and yet "it did unlock and hence uncoupled." The Commissioners say that as the Gould coupler fulfills the requirements of the Interstate Commerce Law they cannot condemn it, and therefore they conclude that "the accident was caused by a combination of unfortunate circumstances for which no one was especially to blame."

It appears that the Boston & Maine has stopped using coke for fuel in those passenger locomotives which make long runs, on account of difficulty in keeping the flues open. This difficulty was mentioned in Mr. Fowler's article on the subject in the *Railroad Gazette*, June 22 last. He said: "Clinker tends to form on the tubes and on the grates. In the case of the tubes, it is deposited about the ends and will gradually close them up. After a run of a hundred miles or more it is not uncommon to find a good percentage of the flues entirely closed and others so clogged that a hole scarcely ¾ in. in diam. is left through them. This is the most serious feature of the clinker as it adheres quite firmly so long as there is a hot fire back of it, but is scraped off with comparative ease when the engine becomes cooler." On the through express runs between Boston and Portland this difficulty, as before stated, has necessitated the abandonment of coke. The accumulation of clinker on the tubesheet would become so thick before the end of the run that some of the tubes would be completely closed and the draft destroyed. Various expedients were tried in order to remedy the difficulty, but nothing effective could be found, so the use of the fuel for that particular service has been given up.

NEW PUBLICATIONS.

Catalogue of the Library of the American Society of Civil Engineers.

The Board of Direction of the American Society of Civil Engineers has caused to be printed a catalogue of the library of that Society, which is now distributed to members. It is an octavo volume of 700 pages. When the Society moved into its new house, it became possible to have a systematic and convenient arrangement of the library. This was made and three indexes were begun; namely, an author index, a subject index and a classified index. The latter of these is now printed in this catalogue, which gives a convenient means of ascertaining what is in the library. The classification, in general and in its sub-divisions, seems rational and calculated to aid in the actual use of this valuable collection of engineering literature. Furthermore, it is pointed out that the publication of this catalogue gives to public-spirited members of the Society an opportunity to add greatly to the value of the library by contributing books which are not now in it, and by helping to fill out incomplete files of periodicals and documents. It is not necessary, we are sure, to do more than to call attention to the fact that this catalogue is now published. No doubt many members will at once avail themselves of it, not only for information about books to read or consult, but as an incentive to add to the collection by their gifts, and also by suggestions of books that should be bought to make the library more useful.

Notes on Some European Iron-Making Districts; A Collection of Letters to the *Iron Age*. By Charles Kirchoff.

Last spring and summer Mr. Kirchoff had an opportunity to look at some of the iron works in Germany, in the Lorain districts, and later in England. The results of his observations were printed in a series of letters to the *Iron Age*, and these have now been collected in a thin volume, large octavo of 113 pages. The letters cover

the iron industries of Germany in considerable detail, then take up certain districts of Lorain, Luxemburg and France, and give some particulars of the British iron industry, which to-day is of such immense importance to the philosopher as well as to the manufacturer. One short letter is devoted to the German machine tool market and one to paternalism and industrial development. This last should be read and pondered very carefully by daily newspaper editors and "statesmen" in general. It is very short and even if they should commit it to memory is would not be much of a tax upon their intellects.

TRADE CATALOGUES.

High-Speed Engines for Heating, Ventilating, Etc.—The American Blower Co., Detroit, Mich., sends a catalogue of the "A B C" high-speed vertical and horizontal engines for heating, ventilating and drying installations. In the introduction the company says "high speed, continuous service and neglect are three elements universally encountered in blower work. Coupled with them is the unvarying necessity of close regulation speed." The company claims to produce a high-speed engine that will stand this service, and the test of wide use seems to show that the claim is well-founded. The catalogue contains 40 pages, with illustrations and the usual information.

The Bessemer Heavy Traffic Freight Route.

In an article in the *Railroad Gazette* of Nov. 24, 1899, on the subject of large capacity cars, attention was called to the fact that a great impetus was given to the development of that class of rolling stock by the first large order in this country which was placed by the Pittsburgh, Bessemer & Lake Erie R. R. It had been argued by many men that the car of great capacity offered a more economical method of hauling heavy freight than smaller cars; but it remained for the managers of the property mentioned to set the wheels of the high capacity car in motion. Time and experience have demonstrated the wisdom of the action that was taken, in that this road now probably hauls the highest average paying trainload of any road in the world.

That this should be so is probably due to the peculiar position in which the road is placed and the nature of the traffic that is offered. Formed by the consolidation of a number of minor roads that served merely as feeders for other lines, and built with the view of achieving the lowest possible first cost, it is not provided as yet with the best possible alignment and profile that is attainable between its termini. Neither were these properties in their original condition, well calculated to handle a heavy traffic with economy. Since the consolidation the aim of the management has been to so modify grades and alignment that the heaviest loads can be hauled without delay and with the minimum of assistance on the unavoidable hills. This work has not been entirely completed, but is being rapidly matured and executed.

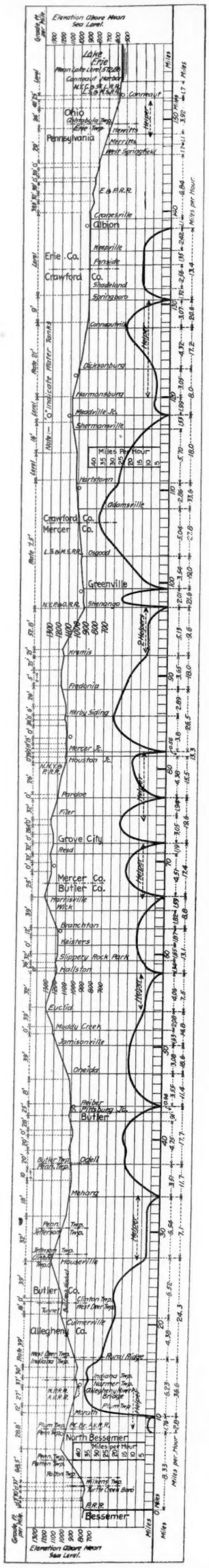
The road starts from Bessemer, eleven miles east of Pittsburgh, and runs a little east of north to Butler. From Butler it runs west of north to Greenville and Albion. At the latter point the main line turns sharply to the east to Erie, while a branch of about 15 miles in length turns sharply to the west, crosses the Ohio line and runs to Conneaut Harbor. It is with this latter line that we have chiefly to deal, as over it all of the heavy traffic is hauled.

In this distance of 154 miles the road first climbs up over the hills forming the banks of the Allegheny River, and thence through a rolling country with hills gradually diminishing in height until the level country south of Lake Erie is reached with a final somewhat rapid drop down to the level of that body of water.

The road is peculiarly situated in regard to its traffic. It was organized primarily to carry iron ore from Conneaut Harbor on Lake Erie to the great steel works at Homestead and Duquesne. This traffic has increased with the ability of the road to handle it and is constantly growing. The traffic in the opposite direction consists of coal destined for lake ports and is either delivered on board steamers at Conneaut Harbor or taken across Lake Erie to Canada on a car ferry. The local traffic is small in amount because of the fact that nearly all of the larger towns, through which the road passes, are reached by two or more competitors for their traffic while that of the small villages, served by this road alone, is insignificant in amount.

The main traffic of the road, therefore, consists of coal and ore that is carried from terminal to terminal. As these are best handled in bulk and in full carloads it is very evident that all of the theoretical advantages of high capacity cars have here the most favorable opportunity of a realization in practice.

The rolling stock consists of 1,600 steel hopper bottom cars of 100,000 lbs. capacity, 2,912 steel drop door gondola cars of 80,000 lbs. capacity, 25 mogul locomotives weighing 167,000 lbs., of which 152,000 lbs. are upon the driving wheels; 14 consolidation locomotives weighing 172,000 lbs., of which 156,000 lbs. are upon the driving wheels, and two consolidation locomotives weighing 250,300 lbs., of which 225,200 lbs. are on the driving wheels. The track is laid with steel rails weighing 100 lbs. to the yard. There are two sections of double track, aggregating, in all, six miles. A system of block signals is also in use. These are manually operated semaphores that are not interlocked but are controlled by the operator at the stations where they are located under advice from the block stations next in advance in either direction. They are operated as an absolute block, and in the case of the branch from Albion and Cranesville to Conneaut Harbor the system is carried to the extreme of rigidity and simplicity. On this portion of the line there are run during the 12 hours of the day, three passenger and an average of six freight trains in each direction. None of these trains are scheduled and no train orders are issued. They are run on the absolute block system, the only precaution taken being that care is taken not to start a freight train from either terminal at a time that will cause it to delay the running of a passenger train.



Profile of the Pittsburgh, Bessemer & Lake Erie—Also Speed Diagram as Deduced from a Train Sheet.

It is, however, in the loading of the engines, the weight of the trains hauled and the low cost of operation that the chief interest in the Pittsburgh, Bessemer & Lake Erie centers. As already stated it is the settled policy of the road to haul the maximum load between terminals. By this maximum load is not meant the hauling of the heaviest possible train over the steepest gradient and then allowing the engine to run over the remainder of the line with a comparatively light train. Instead of this the engine is loaded with what it can haul over the average grades and helpers are used to assist over the steeper portions of the line. This system involves the use of helpers at eight places on the line, with the result that the locomotives are worked up to their full power for the whole distance between terminals except where the grade is favorable. The idea being that it is more economical to assist a train over the steepest grades than it is to allow a few short sections of five or six miles in length to become the controlling element of the trainload for the whole length of the road. In fact, in the original report on the extraordinary average paying load that is hauled on this road, it was stated that it was more economical to assist trains over the high grades than it would be to reduce them; in other words the absolute cost to assist trains is less than would be the interest account on the expense of reducing the grades.

For convenience in the making up of trains they are composed of a certain number of units. A unit consists of 13,000 lbs., and was adopted because it is approximately the weight of the lightest car upon the road when empty. That is to say, it is the weight of an empty flat car. The unit classification is as follows:

Loaded Cars.

Gross weight not exceeding						32,000	pounds	2 units
Over	32,000	pounds	and	not	exceeding	45,000	"	3 "
"	45,000	"	"	"	"	58,000	"	4 "
"	58,000	"	"	"	"	71,000	"	5 "
"	71,000	"	"	"	"	84,000	"	6 "
"	84,000	"	"	"	"	97,000	"	7 "
"	97,000	"	"	"	"	110,000	"	8 "
"	110,000	"	"	"	"	123,000	"	9 "
"	123,000	"	"	"	"	136,000	"	10 "

Empty Cars.

All empty cars with exceptions noted below 2 units. Refrigeration, furniture, gondola and box cars 3 units.

The train rating for the mogul locomotives mentioned above is 400 units from Albion to Pardoe, where 30 units are dropped for the balance of the run to North Bessemer. For the consolidation engines the rating is 430 and 400 units respectively. As the road rises very rapidly from the lake to West Springfield, and as this rating is much in excess of what the regular road engines, even with the assistance of a helper could haul, two exceedingly large consolidation locomotives have been built and put into this service. They have cylinders 24 in. in diam. with a piston stroke of 32 in. The boiler shells are 7 ft. 0 in. in diam. and contain 406 tubes and a total heating surface of 3,805 sq. ft. Their weight is 250,300 lbs., of which 225,200 lbs. are upon the driving wheels. But even these monsters are unable to haul the 400 units with which they are rated up the first portion of the climb from the lake and they are assisted by a 10-wheel pusher. In this way the trains are made up at Conneaut Harbor and are run through to the southern terminal with the minimum amount of switching.

The system of unit reckoning is of great assistance to yardmen and conductors in the making up of trains and the estimation of their weights. The cars are all weighed and billed in accordance with the actual and stenciled weights. To determine the number of units in a train it is a simple matter to take these weights, write down the number of units and foot them up. Such a course avoids the use of large numbers and minimizes the work of the conductor. As a matter of experience it is very remarkable how closely the wide margins allowed in the estimation of the number of units will average into the numbers used in the determination of the trainloads.

A reference to the profile of the road will show that it contains eight sharp ascents between Lake Erie and North Bessemer, between which there are stretches of level or short or easy grades. The rating for the consolidation and mogul locomotives is based upon what they can haul over these level and easy stretches regardless of the heavy grades. The result is that there are seven points between Albion and North Bessemer where helpers are used. These are from Springboro to Dicksonsburg; from Shenanago to Kremis, where two helpers are put on; from Mercer Junction to Filer; from Grove City to Harrisville; from Halston to Euclid; from Meharg to Houseville, and from the Allegheny River Bridge to North Bessemer. Thus we have eight helping engines in a distance of 130 miles working over a total distance of about 35½ miles, or a trifle more than 27 per cent. of the whole.

Let us see what may be the economical effect of this

method of operation. From an observation of the working of the engine on the grades it is safe to say that, were the system of helpers to be discarded, the train hauled over the road by the unaided engine would not be more than half what it is now.

The schedule time from Albion to North Bessemer is 12 hours and 15 minutes, or about 10½ miles an hour for the whole distance, including stops. On favoring grades the speed is higher, but upon adverse grade, both where helpers are in use and where the road engine is doing its work unassisted, the running speed maintained is but little less than the average for the whole length of the run.

In the illustrating diagram the grades over the whole length of the line from Conneaut Harbor to Bessemer are shown, and beneath there is a diagram showing the running of an ore train from Albion to North Bessemer, as taken from the dispatcher's train sheet. In the lower curve the ordinates show the speed in miles per hour, the horizontal lines indicating differences of five miles per hour. With this particular train there was a variation from the regular helper service in that the last one was attached at Morath instead of at the Allegheny River Bridge to run to North Bessemer.

With the minimum traffic of six trains in 12 hours and allowing a minimum of 30 hours for a round trip, eight locomotives can take care of the road traffic, to which must be added eight more for helpers. To take care of this same traffic without helpers and allowing the same engine mileage would require 12 trains for each 12 hours, which, with thirty hours for a round trip, would call for at least 30 locomotives to handle the same traffic. These figures may not be absolutely accurate, but there is such an ample margin between the two systems that an exceedingly liberal allowance can be made to the most captious critic and still have enough left to show a very substantial saving.

In point of fact the loads hauled and the cost of hauling it are so remarkable as to cause some doubts of the accuracy of the statements made, to exist in the minds of those whose roads are not so favorably situated for the handling of the traffic offered. Take for example a full train load of ore in cars of 100,000 lbs. capacity and consisting of 430 units or 5,590,000 lbs. Of this weight 1,548,000 lbs., or about 27.7 per cent., is the dead weight of the cars, leaving a net paying load of 4,011,000 lbs., or 2,005½ tons. This is, of course, an example of the most favorable kind, but when all of the traffic of the road is taken into consideration, including the local freights where light loading must necessarily prevail the average net train load, exclusive of the weight of cars and engines, runs from 900 to 1,000 tons, hauled at an average ratio of expenses to gross receipts (including new work) of from 47 to 50 per cent.

The above figures are, to an extent, possibilities. To refer to actual statistics the following are taken from the latest monthly report available at the time of the preparation of this article.

The ratio of expenses to gross earnings (including new work) was 46.4 per cent.; the total net tons handled was 435,807; the rate per net ton mile was 4.07 mills; the ton-mile cost was 1.8 mills; the maximum weight of train, including light weight of cars, was 2,194 tons; the maximum weight of trains, excluding the light weight of cars, was 1,688 tons; the average paying load of all freight trains was 914.49 net tons, and the total extra cost per ore train-mile for helping engines was 5.8 cents. The average ore train carried 1,631 net tons.

It will be noticed that particular stress has been laid upon the movement of the freight from Conneaut Harbor to North Bessemer and that no attention has been paid to the movement in the opposite direction. The reason, therefore must have been surmised, namely, that the direction indicated is that of the heavy or controlling traffic. In the opposite direction there are many empty cars to be hauled and the trains are quite insufficient to load the engines to their rated capacity, hence there is no feature beyond the actual movement of the cars that requires the especial attention of the officials.

The work of making up the trains is done at Conneaut Harbor by the railroad company whence they are hauled to North Bessemer. The tracks of the Pittsburgh, Bessemer & Lake Erie R. R. extend to Bessemer, however, a distance of 8.7 miles further. This portion of the road is operated by the Union R. R., which is a switching road. The trains are hauled into North Bessemer and there delivered to the switching company, by which the cars are sorted and distributed. The northbound trains are also made up by the Union R. R. and hauled to North Bessemer, where they are delivered to the engines of the P., B. & L. E. R. R.

At Conneaut Harbor, on the other hand, there are elaborate facilities that are capable of handling 20,000 tons of ore per day, a subject that will be treated with some elaboration of detail in a future article, and which will include all matters relating to switching and the making up of trains.

Big Cars in England Again.

In his inaugural address as President of the Liverpool Engineering Society, Mr. J. A. F. Aspinall, General Manager of the Lancashire & Yorkshire, touched on matters of vital interest to British traders as well as railroad companies. One of the statements often made as to a possible reduction in the cost of goods transport is that very much larger cars should be used for coal and ore. Mr. Aspinwall pointed out that while the railroad companies in Great Britain own for all purposes about 677,000 wagons, the private coal owners and collieries alone own as many as 550,000. Any change, therefore, affecting these wagons requires great consideration before being carried out. The coal dealer, for instance, prefers three 10-ton wagons to a 30-ton wagon because, when one of the three is emptied it can be sent back to the colliery, and loaded and returned before the other two are emptied, whereas with only one large 30-ton wagon one-third remains idle whilst the other two-thirds are being emptied. Even where the unloading is sufficiently rapid to make out a better case for the 30-ton wagon, as when coal has been taken by large consumers for factories, only one or two colliery owners appear to have welcomed it.

In the export of coal there are special difficulties due to the fact that three parties are concerned in it, the colliery or wagon owner, the railroad, and the dock company. Although full trainloads are always available in this case, there are no appliances for shipping coal for export which can deal with any wagons other than the ordinary English form, without entire reconstruction of the dock machinery, and in some cases alteration of the approaches. Again, the wagon-owners are not prepared to build new rolling stock, because of the uncertainty of contracts; *e.g.*, a colliery which shipped large quantities one year might be obliged to sell for inland consumption the next. The people, therefore, who control the dimensions of wagons are the private wagon-owners, mainly the colliery companies, and the dock authorities of the ports of shipments.

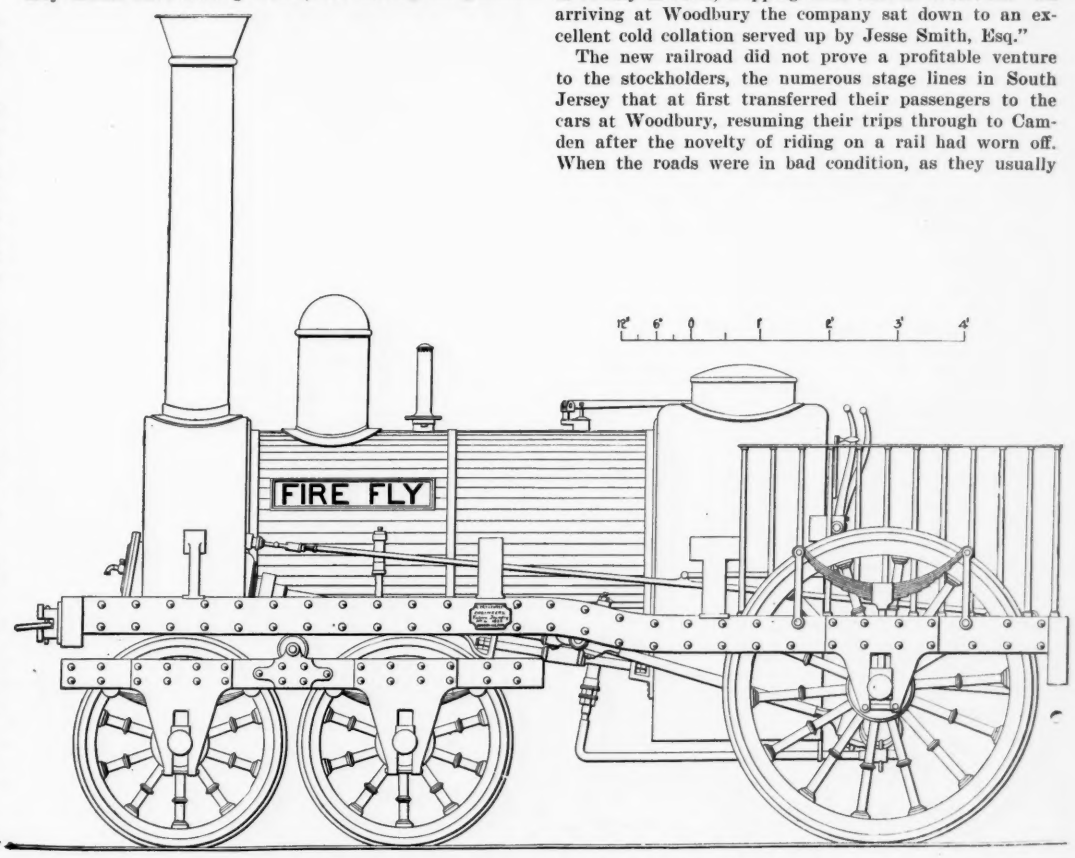
The use of large bogie wagons for coal will be welcomed by the railroads in all those cases where full loads can be carried, and they can be at once emptied and returned to their owners.

Camden & Woodbury Railroad Engines.

BY HERBERT T. WALKER.

In the year 1833, Charles Tayleur & Co., of the Vulcan Foundry, near Warrington, England,* built two locomotives for the Camden & Woodbury Railroad. This road was a branch which extended from Camden, N. J., eight or ten miles south to Woodbury, and was built as a connection to the Camden & Amboy Railroad. It subsequently became a part of the West Jersey & Seashore Railroad, and all are now included in the Pennsylvania Railroad System.

It appears that in 1832 the engineer of the Camden & Woodbury Railroad ordered the two engines in question, indicating their chief dimensions and stipulating that they should have leading trucks, but leaving the general design to the discretion of the builders. George Stephenson, who was a partner in the firm of Tayleur & Co., probably had a hand in their development.



The Fire-Fly—Built 1833 by Charles Taylor & Co., Warrington.

These two engines were duplicates, and were named "Fire Fly" and "Red Rover." They were entered in the makers' books as "Order No. 3, Construction Nos. 4 and 5, Class G," and were shipped to America in March and April, 1833.

The "Fire Fly" is illustrated herewith. As will be seen it was an inside connected, fuil crank engine, and differed but little from Jervis' "Experiment" for the Mohawk & Hudson Railroad of 1832, which was the first engine with a leading truck and was illustrated in the *Railroad Gazette*, Feb. 3, 1872, also in the *Scientific American* Supplement, May 1, 1897.

The principal dimensions of "Fire Fly" and its mate were: Cylinders, 9 in. diam. by 14 in. stroke; driving wheels, 4 ft. 6 in. diam., and truck wheels 3 ft. diam. The weight was 22,400 lbs., 12,320 lbs. resting on the driving wheels. Diameter of boiler, 2 ft. 7 in. Total wheel base, 10 ft. 3 in. Height of chimney from the rails 12 ft.

The valve gear is not clearly shown, but it appears to have a single eccentric with a rocking shaft at the rear end of the foot plate.

The frames were of the "sandwich" design, of which George Stephenson was the originator. They were made of wrought iron plates with a filling of wood between them, and were bent vertically to make room for the truck frame, which was of a like construction. The truck frame had roller side-bearings as shown. The piston rods were very long, similar to those on the well known early Baldwin engines. The lock-up safety valve near the steam dome was enclosed in a casing having a perforated top, and the fire-box was provided with a manhole which was covered with a jacket of polished brass.

So much for a description of the engines, but in taking up the history of the railroad for which they were built, a discrepancy has been encountered which is difficult to clear up.

The engine list of Tayleur & Co. shows that the locomotives were built and delivered in 1833, and in a "Report made to the House of Representatives by the Secretary of the Treasury of the United States in 1838, showing Locomotives used on American Railroads in that year which were imported from England," it is stated that the two engines described had been "in use five years"; but, through the courtesy of General W. J. Sewell, President of the West Jersey & Seashore Railroad Co., the records at Camden have been searched, and the books show that it was not until 1836 that the Camden & Woodbury Railroad Co. obtained their charter, and it was nearly two years thereafter before the road was constructed and equipped for business, the opening day being Jan. 29, 1838, when three trips each way were made. Subsequently the number of trips was increased to five daily, including Sundays. Previous to the opening a trial trip was made, which was described in the Woodbury *Constitution* as follows:

"The Camden & Woodbury Railroad was opened through from Camden to Woodbury on Saturday last (Jan. 20, 1838). The locomotive "Fire Fly," having in train the new and beautiful passenger car "Woodbury," 40 ft. in length, filled with gentlemen, made the passage in twenty minutes, stopping some time at Westville. On arriving at Woodbury the company sat down to an excellent cold collation served up by Jesse Smith, Esq."

The new railroad did not prove a profitable venture to the stockholders, the numerous stage lines in South Jersey that at first transferred their passengers to the cars at Woodbury, resuming their trips through to Camden after the novelty of riding on a rail had worn off. When the roads were in bad condition, as they usually were in the winter months, the mail coaches had difficulty in making connection with the cars on schedule time and when they failed to do so passengers and mail bags had to wait for the next train. The fare on the cars was 25 cents from Woodbury to Camden, and an additional 5 cents for ferriage to Philadelphia. With the loss of the important stage traffic, the car trips were reduced to three each way daily; then the locomotive "Fire Fly" was dispensed with as too expensive and horses employed as the motive power. The businsss continued to dwindle, and after a five or six years' struggle for existence the road was abandoned and the material sold for old junk, the heaviest financial loser in the enterprise being John Campbell, the contractor who built

*See *Railroad Gazette*, July 9, 1897, p. 488.

the road, and with his brother, Amos, raised or furnished most of the money expended.

The difficulty may be explained on the theory that the engines were ordered from England when the railroad was projected, before work was actually begun, and that as the Camden & Woodbury Railroad was built as a connection to the Camden & Amboy Railroad, the engines were put to work on the latter road until such time as the Woodbury branch should be ready for traffic, which occurred, as we have seen, in 1838. When the State Secretary was collecting data for his Report (in the same year) he was informed that the engines belonged to the Camden & Woodbury Railroad and had been "in use five years," which was true as far as it went, but he was probably not told that they had previously worked on the Camden & Amboy Railroad.

New Railroads in Virginia.

Latest reports to the *Railroad Gazette* show that seven companies, of which six are new, are building lines in Virginia, which, when completed, will increase the railroads by 65 miles. New building this year for six months up to June 30 aggregated 36 miles, while the additions in 1899 were 64 miles, and in 1898 66 miles. The smallest building in recent times was in 1894 when only 11 miles was completed. Almost as little, only 12 miles, was built in 1896, contrasted with the 200 miles built in 1891 and 298 miles in 1889.

Virginia's first line of railroad was completed in 1831, from Richmond to Chesterfield Mines, 12 miles. Ten years later the State had 223 miles, and only 384 miles in 1850. By 1860 Virginia had 1,379 miles, or a little over one-third her present mileage. Then came the war and reconstruction period so that she gained but 107 miles in the following ten years, and but 407 miles more to 1880. After that the new railroads multiplied rapidly, 327 miles being completed in the single year 1881, the record year, and 220 miles the following twelve months. The state had 3,360 miles in 1890, and 3,721 miles at the end of 1899. With the new mileage completed this year, there is nearly 3,800 miles of railroad now within the state.

The Virginia-Carolina is a new company which has bought the right of way of the old Abingdon & Damascus and is completing the line. It is to run from Abingdon, on the Norfolk & Western, in the western end of the State, southeast 17 miles to Damascus, and thence three or four miles more to the Tennessee line. Grading is practically completed and tracklaying was begun in July. A further extension has been surveyed from the Tennessee line to Shady Valley, with several spurs to ore mines in Johnson County, Tenn. Three counties to the east a railroad is being extended from North Carolina into Patrick County, Va., under the title of the Mt. Airy & Eastern. It is to run from Mt. Airy, N. C., terminus of a branch of the Southern, north five miles to the Virginia line and thence 14 miles to Kibler. It was completed to Cross Roads, Va., 5½ miles north of the line, at last report, and the grading and bridging are practically done to Kibler. Another line is building into the state from North Carolina, from a point on the Atlantic & Yadkin line of the Southern. It is to be a timber line 12 miles long.

The Younkin Lumber Co., under the title of tne New River, Holston & Western, is building a railroad from Narrows, Va., on the main line of the Norfolk & Western, to run west seven miles to Wolf Creek. An extension is proposed further west through Giles and Bland counties to the Kentucky line. From Narrows another line is projected northwest through West Virginia to Charleston, about 140 miles, called the Hinton, New River & Western. Building is in progress from Hinton, W. Va. A new line is building from another point on the Norfolk & Western, at Montvale, a few miles east of Roanoke. It is for the use of the Carter syndicate iron mines, situated south four miles on the Blue Ridge Mountains. From Shenandoah, on the Norfolk & Western, the Shenandoah Furnace Co. has graded a line six miles long to Massanutton, called the Virginia Northern.

The Norfolk & Western itself is building a cut-off seven miles long near Radford. It is to run from Back Creek to Cross Creek, and will connect the main line north with the branch west to Bristol. The company has recently let a contract for five miles additional on the Ivanhoe branch near Pulaski, which is to run west 20 miles in all to Speedwell in the Cripple Creek Valley. Surveys have also been made for the extension of the Betty Baker branch, a few miles east of the Ivanhoe branch, to run south about nine miles to Hillsville.

In addition to the above lines there are about 30 roads aggregating some 800 miles that have recently been projected in the state. Most of these are by new companies, and the larger part will doubtless never get beyond the paper stage. Among the proposed roads is one by the Marion & Rye Valley, which is an old road running from Marion on the Norfolk & Western, south 6½ miles to Currin Valley. Surveys have been made for an extension of 10 miles south from Currin Valley to Rye Valley. The Rockingham & West Virginia is a new line projected from Gordonsville, on the Chesapeake & Ohio, west about 75 miles to Franklin, W. Va. It is proposed to run the line from Gordonsville northwest about 30 miles to Elkton to connect with the Chesapeake & Western, which will be utilized from that point west 20 miles to Harrisonburg. Surveys have been made from Harrisonburg to the summit of the Shenandoah Mountains, 23 miles. The road may be extended on from Franklin, W. Va., in all about 200 miles. Gen. James S. Negley, one of the promoters of the Richmond, Petersburg & Carolina line of the Seaboard Air Line, is President of the new company. The Seawright, Lithia Springs & Augusta is projected from Staunton north about 18 miles via Seawright Springs to Bridgewater, western terminus of the Chesapeake & Western. The company is contemplating a sanitarium and hotel at the Springs, 11 miles north of Staunton.

The Virginia Legislature has approved of the charter of the Brock's Gap R. R. Co., which proposes to build from Broadway, in Rockingham County, on the Southern Ry., west up the Shenandoah River through Brock's Gap to the West Virginia State line. Another new line to run from a point on the Southern is the Charlotte County, named from the county through which it is projected. It is to leave the Southern from some point not named, and run north to Smithville and thence to a point on the Norfolk & Western in Prince Edward County.

A number of roads are projected in the eastern part of the state. The James River is a new line proposed from Portsmouth northwest about 25 miles through the counties of Norfolk, Nansemond, and Isle of Wight, to Smithfield on the James River, with branches not to exceed 20 miles. Surveys are made and building is to be begun soon. The charter grants permission under certain conditions for a further extension to Richmond. The Jamestown, Williamsburg & Yorktown is a new proposed line from Jamestown east about six miles to Williamsburg, on the Chesapeake & Ohio, and thence about eight miles more to Yorktown. A branch would run to Kings Mill wharf on James River. From Yorktown the Yorktown, Poquoson & Hampton is projected southeast about 24 miles to Hampton.

Under the title of the Richmond & Tidewater, surveys have been made for a railroad from Ellerson, on the Chesapeake & Ohio, a few miles north of Richmond, to run east about 60 miles to tidewater in Gloucester and Matthews counties. Considerable aid has been granted by counties along the route. Another proposed tidewater line is the Tidewater & West Virginia to run across the northern end of the state. The eastern terminus is located at a point on Chesapeake Bay, between the York and Potomac Rivers, whence it is to run northwest to the West Virginia line. The Great Falls & Old Dominion is making surveys for a line from Rosslyn on the Potomac River, opposite Washington, D. C. The road is to run northwest about 16 miles up the river via Cherrydale, Hillsdale, Lincolnville and Prospect Hill to the Great Falls of the Potomac. It is not improbable that some of the shorter lines mentioned above, particularly those in the eastern part of the State, are designed to be operated by electricity.

Electric Power Transmitted 153 Miles.

Electric current, at effective working voltage, was recently transmitted 153 miles over the combined lines of the Snoqualmie Falls Power Co. at Seattle. A motor was satisfactorily driven, and the test also developed some interesting data on long-distance transmission under various conditions. This information we have received from Mr. Charles H. Baker, President and General Manager of the company.

For several hours the various services of the company were cut off, and all the transmission lines were connected up in one continuous circuit commencing at Snoqualmie Falls, running to Seattle, back to the falls, then to Tacoma and back again to the falls. The regular transmission is 32 miles to Seattle and 44 miles to Tacoma. The single continuous three-phase circuit 153 miles long was composed of 58 miles, 264-mils. aluminum wire, four miles No. 1 B. & S. G. medium hard copper, 51 miles, 234-mils. aluminum wire, 36⅔ miles No. 2 B. & S. G. aluminum cable, 1⅔ miles No. 2 B. & S. G. medium hard drawn copper and 1⅔ miles No. 0 medium hard drawn copper. A Westinghouse 1,500 k.w. three-phase generator was used for producing the current, and a similar machine was used as a synchronous motor at the end of the circuit.

With the 153-mile circuit open at the incoming end tests were made for charging at different voltages, the alternations, 7,200, being kept constant. It was found that as the voltage increased the charging current rapidly increased; that is, at 22,500 line voltage it required 62 kilowatts to charge the line; at 30,000 volts it required 112 kilowatts, and at 35,000 volts it required 180 kilowatts. With the lowering transformers at the falls cut in and their secondaries open it was found that the current required to charge the line increased; that is, at 22,500 volts it required 76 kilowatts and at 30,000 volts it required 123 kilowatts. The voltage at the incoming end of the circuit, with charging current only on the line, was greater than at the outgoing; that is, 22,500 volts out, gave 24,600 volts in, and 30,000 volts out gave 32,100 in. Tests were also made to determine the different amount of charging current required at different frequency, the voltage being kept constant at 30,000, and it was found that at 6,000 alternations 100 kilowatts were required to charge the line; at 6,600 alternations, 105 kilowatts, and at 7,800 alternations, 115 kilowatts.

The line was then tested for loss of power in transmitting a non-inductive load consisting of the water rheostat at the falls at the end of the 153-mile circuit, and it was found that the line voltage out was 30,000, incoming, 22,500; drop 25 per cent. The amperes per phase at 1,000 volts out was 624; incoming, 554; loss, 11.2 per cent. The total kilowatts outgoing was 1,100; incoming, delivered into the water rheostat tanks, 723; loss, 34.2 per cent.

A test was also made for charging current with the sub-station transformers at Seattle and Tacoma and the lowering transformers at the falls in circuit, but with secondaries all open, and it was found that with the 30,000 volts out, there was 31,500 volts in, and that it required 193 kilowatts to charge the line. A test was then made of operating a second generator as a synchronous motor at the end of the 153-mile circuit, and the machines were synchronized without any trouble, but they soon began pumping so that it was found advisable to separate them. During this test the out-going line voltage had varied from 26,700 to 27,600, and incoming from 24,000 to 26,700, giving approximately a drop of 6 per cent., the amperes per phase at 1,000 volts out being approximately 900, incoming approximately 650, loss approximately 27.7 per cent.; total kilowatts out, 432; incoming, 374; loss approximately 13½ per cent. The figures on this last test are approximate only as all of the instrument needles oscillated very much, many of the ammeters fluctuating over the entire range of the scale. The foregoing losses would be greater or less according as the loads carried might be increased or diminished.

The experiment of operating the water rheostat and the synchronous motor in multiple at the end of the 153-mile circuit was tried, and the performance of the motor was very much improved. The water was then shut off from the water wheel and the driven motor immediately reverted to a generator driven by its own inertia. The current in the lines was reversed and the first generator became in turn a motor and ran at the other end of the 153-mile circuit until the inertia was expended.

The Snoqualmie Falls power plant has been building something over two years, and, although the service began a year ago, the plant has only recently been finished. It is the second largest in the United States, Niagara Falls being first. The present development is 10,000 h.p., which is transmitted for electric lighting, street cars, flour mills, and other industrial purposes in Seattle, Tacoma and the intermediate towns. The principal sub-stations are at Seattle and Tacoma. Other sub-stations are at Issaquah, Renton, Kent, Auburn and Puyallup.

TECHNICAL.

Manufacturing and Business.

At a meeting of the Executive Committee of the Safety Car Heating & Lighting Co., Dec. 18, David A. Pye, formerly Purchasing Agent, was made Assistant to the Vice-President of the company.

The Cooke Locomotive & Machine Co., Paterson, N. J., is offering for sale five six-wheel connected switching locomotives, with 20-in. x 26-in. cylinders and 51-in. driving wheels, and weighing about 135,000 lbs., subject to previous sale, for shipment Jan. 15 to Feb. 15, 1901.

The American Engineering Co., recently organized in Springfield, Ohio, to make gas and gasoline engines, elected the following officers on Dec. 4: Vice-President and General Manager, J. F. Winchell; Secretary and Treasurer, Captain, E. L. Dodson. The company will occupy the old Armstrong plant.

Robert T. Mickle, M. E., formerly with the Kensington Engine Works, Ltd., Philadelphia, Pa., has been elected Vice-President of the Philadelphia Pneumatic Tool Co. to fill the vacancy caused by the resignation of Geo. W. Borton. The company reports that it is pressed with orders, and has arranged for a further important increase of capacity.

During the past ten days the Robert Aitchison Perforated Metal Co., 303 Dearborn street, Chicago, has closed a contract with one of the large thresher manufacturers of the Northwest for its season's supply of perforated metals. The company also has an order to furnish more than 60,000 sq. ft. of perforated steel for malt machinery.

The Sturtevant Engineering Co. has recently moved its London (England) office to 147 Queen Victoria street, that city, in order to secure the increased accommodation for its growing business as the European representatives of the B. F. Sturtevant Co., of Boston, Mass. A new branch office has been established at 31 Rue de Provence, Paris, and a change made in the location of the Glasgow office at 45 Hope street. The offices at Berlin, Stockholm, Amsterdam and Milan remain the same.

The entire plant of the Brown Hoisting Machinery Co., Inc., of Cleveland, excepting the office building and patent shop, was destroyed by fire early on the morning of Dec. 17. The loss is about $500,000, fully covered by insurance. The fire started in the shop of the Elwell-Parker Electric Co., which occupied a part of the works of the Brown Hoisting Machinery Co. The severest loss is in the form of work just finished or in the process of building. New works will be built at once, and it is expected that they will be running within 60 days. In the meantime the contracts on hand will be turned over to other concerns for filling.

Bethlehem Steel Co. reports that a contract has been closed with General Electric Co. for six more of the weldless field-rings of Bethlehem nickel-steel for the extension to the big power plant at Niagara Falls. These rings measure 142½ in. in diamater outside, and 130¼ in. inside, leaving the walls 5⅞ in. thick. The width of face is 58¼ in., and the estimated weight of each ring

is about 35,000 lbs. They will be worked up on a mandrel, under the hydraulic press, and are said to be among the largest forgings of this sort which have yet been produced. Among other orders now in hand at the Bethlehem works may be noted the shafts and engine forgings for one of the new ferry boats which are being built at the yards of Harlan & Hollingsworth for the New York ferry of the Central R. R. of New Jersey.

Iron and Steel.

The Carnegie Company has an order for 6,000 tons of rails for the Great Eastern Railway of England for immediate shipment.

The Norwegian Government has given a contract to the Pennsylvania and Maryland steel companies for 11,800 tons of rails.

According to a Montreal despatch the Dominion Iron & Steel Co., whose plant is nearing completion at Sydney, Cape Breton, will build a plate and rail mill.

The Vanderbilt lines have placed an order for 80,000 tons of rails, divided equally between the Carnegie, Lackawanna, Illinois and National steel companies.

W. J. Campbell, owner of the Ottawa Boiler Works, Ottawa, Ont., informs us that he is organizing a company to build a bridge and structural steel works in that city.

A. E. Rendle, 173 Broadway; John Kenny, 39 Cortlandt street, and F. B. Kafka, of New York, have incorporated the New York Bridge & Iron Co. with a capital of $10,000.

John Bott, heretofore Master Mechanic of the mills of the American Steel Hoop Co. at Youngstown, Ohio, has been appointed Chief Engineer at the Brown-Bonnell plant of the Republic Iron & Steel Co., in Youngstown.

The steel plant in Lickdale, Pa., built by John H. Lick, has been sold to Samuel E. Light and others, and will be moved to Lebanon, Pa., and operated in conjunction with the Lebanon Rolling Mills, to make open-hearth steel.

Mr. Y. Watanabe, Architect for the Imperial Japanese Navy, has contracted with the American Bridge Company for the steel work for a foundry, and a gun and mounting shop for the Kure Aresenal. The American Bridge Company is also furnishing steel work for the forge shop for the Kure Arsenal.

The monthly blast furnace statistics published by *Iron Age*, show that for the first time since June 1 there has been an increase in the production of pig iron, the capacity of the coke furnaces at work on Dec. 1 being 222,067 tons weekly, as compared with 207,381 tons on Nov. 1 and 288,771 tons on June 1.

Tropenas Steel Castings.

The new steel casting plant of the Sargent Company at Chicago Heights, described in our issue of Aug. 31, has now been working for about ten months, and the company is satisfied that the Tropenas process, as there used, fully meets its expectations. Hereafter a specialty will be made of small work which before now could not be made economically in cast steel. Attractive inducements will be offered in the matter of delivery and price and doubtless a large business will be done. The particular advantage of the Tropenas process for this class of work lies in the fact that the metal as it comes from the converter is hotter and more fluid than that produced in other ways, permitting castings to be made having light sections. As the bulk of these small pieces do not require annealing and as machine-made molds can be largely used, the work can be handled with little lost time. The output of the plant is now from 20 to 30 tons of castings a day with a much larger output possible. The castings are said to be sound and smooth, and where desired, metal can be made which will stand forging and welding. In fact it is claimed that these castings are in all respects equal to forgings in strength and weight.

The Gokteik Gorge Viaduct.

A despatch from Rangoon, Burmah, says that the Gokteik Gorge viaduct, in the Shan Hills, the highest railroad bridge in the world, has been successfully completed by the Pennsylvania Steel Co. and formally turned over to the Burmah Railway. The bridge spanning the Gakteik Gorge is 2,260 ft. long and 320 ft. high over the deepest part. The bridge is built entirely of steel. It has 16 supports of lattice steel work 140 ft. apart. The supports vary in height from 20 to 320 ft., and the base of the highest is 135 ft. square. About 40,000 tons of steel were used. Shipments were made in July, August, and September of last year.

Another Rail Mill Proposed for Alabama.

According to a statement made by President E. O. Hopkins, made while in New York last week, the Sloss-Sheffield Steel & Iron Co. will probably manufacture rails. The directors are awaiting the results of the experiment now being made by the Tennessee Coal & Iron Co., which is equipping a mill at Ensley, Ala., to make open-hearth rails.

Compressed Air in New York.

The Metropolitan Street Railway Company has taken over the compressing plant and car equipment which is running on the 28th and 29th street lines. Up to this time the Compressed Air Company has charged the car reservoirs and maintained the car equipment at its own expense.

Blowers for Forced Draft.

The boilers of the new 18-knot Ward Line steamship "Morro Castle," having 442 sq. ft. of grate surface, are equipped for forced draft furnished by four special Sturtevant fans having wheels 66 in. in diam. driven by direct-connected double-enclosed engines designed to run at 480 r.p.m.

THE SCRAP HEAP.

Notes.

The Burlington & Missouri River is putting electric headlights on a number of locomotives.

The Employees' Savings Fund of the Pennsylvania Railroad has been extended for the benefit of the employees of the Allegheny Valley and the Western New York & Pennsylvania road, recently acquired by the Pennsylvania Railroad.

According to the local newspapers only one train will hereafter be allowed in the Hoosac tunnel at a time, except in the case of light passenger trains. This regulation is to mitigate the annoyance from smoke. This tunnel, five miles long, has a double track throughout.

A. A. Hickerson, who sued the Baltimore & Ohio in the United States Circuit Court at Toledo for damages for having been discharged and blacklisted, has been awarded by the jury the sum of $400; but, according to the newspaper reports, the damages are assessed by the jury because a statute of Ohio requires a railroad to give to a dismissed employee the reasons for his dismissal, and not because there was any evidence of blacklisting.

A press despatch from Washington, on Thursday of last week, reported that Frank Barry, of Milwaukee; L. W. Noyes, of Chicago, and representatives of millers from Jacksonville, Ill., Wichita, Kan., and other cities, were at the capital to see the "steering committee" of the Senate with a view to having action taken on the Cullom bill. J. M. Langley, of New York, representing the Merchants' Association, was also there. Senator Cullom thought that the bill could not be brought up before the holidays; and Mr. Barry says that if it must go over until after the holidays it might as well be given up.

According to the Los Angeles *Times*, of Dec. 4, the conductors, enginemen and other trainmen of the Sonora Railroad, who were detained in prisons in Mexico an outrageously long time, waiting for trial on charges made in connection with fatal accidents caused by cars and engines, have been released; and this has been brought about by the direct intervention of President Diaz. In response to urgent telegrams from the officers of the Southern Pacific, President Diaz directed the state authorities at Hermosillo to detain as little as possible trainmen arrested or held as witnesses; to give speedy hearing to all railroad men arrested, and to avoid enforcement of indignities to which the trainmen have heretofore been subjected, such as close guard at the point of the bayonet; and to release trainmen arrested for accidents on the line, just as soon as their innocence is shown. The enginemen and conductors generally feel that now they have a degree of protection, and most of them have returned to their work, so that trains have resumed regular trips.

Fast Trains to Florida.

Fast trains are to be run between Chicago and Florida this winter over two different routes. The train over the Chicago & Eastern Illinois will be put in service Jan. 7 and will run by way of the Louisville & Nashville and the Plant system to Jacksonville, and thence by the Florida East Coast to St. Augustine. The cars will be of the latest design and the train will have dining cars, serving meals by the card. This train will leave Chicago at 10:30 a. m., and run to Jacksonville in 31 hours. The train over the Chicago, Indianapolis & Louisville will be put in service Jan. 14. This train will run over the Cincinnati, Hamilton & Dayton, the Cincinnati, New Orleans & Texas Pacific, the Southern Railway and the Plant System. It will have through sleeping cars to and from Cleveland, Toledo and Detroit. The newspaper reports say that the time of this train will be 32 hours to St. Augustine, practically the same as that of the rival train.

The Revenue Freight Traffic of the Siberian Railroad.

In 1899 the revenue freight traffic over the Western and Central Siberian Railway amounted to 650,000 tons, consisting in the main of Siberian cereal, which forms the principal article of export. In 1897 the total exports of cereals from Siberia amounted to 220,000 tons; to 330,000 tons in 1898, and to 320,000 tons in 1899. There were also carried in 1899 12,099 Siberian horses for export. They come chiefly from Petropolovsk and Omsk. The exports of Siberian cattle amounted to 15,838 head in 1899. Most of these cattle were shipped to St. Petersburg and Krasnoje Selo for the army. In the same ratio as the exportation of cattle has increased, so has the exportation of fresh and salted meat. A few years ago prepared Siberian meat was only used for military purposes, but it is now sold in many Russian cities. Other leading freight items were hides and skins and all kinds of animal products. Butter seems also to have become an article of export from Siberia. In 1899, this exportation amounted to 10,400 tons, and 1,700 tons of eggs were also exported in 1899. The administration allows special rates for game, cedar nuts and tea. During the last year a number of special cars for the transportation of game have been introduced. It was only in 1899 that larger quantities of tea were carried, and a custom house, together with a tea depot, has been established at Tcheliabinsk, in Western Siberia.

Railroad Contract in Nicaragua.

Consul Donaldson reports from Managua, Nov. 1, that the Government of Nicaragua on that day conceded to Mr. Julio Wiest the contract for about 38 miles of railroad which is to connect the capital directly by rail with Leon of Corinto, by a road around the lake, connecting at La Paz with the Western division, now in operation. This will avoid the delay and cost of changing freights from the cars to steamboat at Managua and from steamboat to cars again at Momotombo. The railroad is to be finished within two years, and is to cost $23,000 in Nicaraguan currency (about $8,000 gold) per mile.

Train Robberies.

On the evening of Dec. 13 an express train of the Illinois Central was stopped by robbers within the limits of the city of New Orleans and the mail car was robbed of the registered letters. The express car was blown open with dynamite, but nothing of value was taken from it. The conductor was shot and dangerously wounded.

On the morning of Dec. 13, about 6 o'clock, robbers got into the postal car on a northbound train of the St. Louis Southwestern, about 30 miles south of Texarkana, Tex., and, after beating the mail clerk insensible, stole the registered letters. It is believed that there were two robbers. Before committing the robbery the men had uncoupled the express and mail cars from the rest of the train three times, but in each case it appears that the trainmen recoupled the train without taking effective measures to ascertain why the couplings had come apart.

Freight Rates West of Chicago.

Pursuant to the action of the conference of presidents of Western railroads, held in New York, Dec. 6, President Jeffery, of the Denver & Rio Grande, who was Chairman of the conference, has appointed an advisory committee of bankers and investors to confer with and advise the railroad officers in rate matters. This committee includes Robert Bacon, of J. P. Morgan & Co.; Jacob H. Schiff, of Kuhn, Loeb & Co.; Robert Fleming, E. H. Harriman and James Stillman.

A press despatch from Chicago, dated Tuesday, says: Executive officers of the Western roads have held a meeting here to provide measures for the strict maintenance of rates after Jan. 1, as agreed upon at the recent New York conference. It is admitted that the district committees have not secured an equitable distribution of traffic, and that freight rates between Kansas City and Chicago, and St. Paul and Chicago have been badly manipulated. The executive officers decided to-day that no more freight is to be carried at cut rates between Chicago and Kansas City or Chicago and St. Paul after Jan. 1.

Fast Run on the Burlington.

A fast run on the Burlington & Missouri River, between Omaha and Billings, Mont., was recently made with a special train of an engine and one car. This special left Omaha at 1:47 p. m., Dec. 13, and reached Billings, 893 miles distant, at 6:48 the next morning. The average speed, without deductions for time lost in changing engines or by other stops, was a little less than 52 miles an hour.

The New East River Bridge.

The last saddle for the new East River bridge has been placed in position on the Williamsburg side, and the work of making the cables will be begun in a short time by the Roebling Company. Footbridges will be constructed so that it may be carried on rapidly. There will be four cables, 19 in. in diam., each containing 10,000 wires. The weight of the cables alone will be about 4,500 tons.

The Albany Union Station.

The new passenger station of the New York Central & Hudson River Railroad, at Albany, was used the first time on the morning of Dec. 17. This station was described and illustrated in the *Railroad Gazette*, Dec. 16, 1898, p. 890. The Delaware & Hudson will not begin to use the new station for several weeks.

Panama Railroad Steamers.

The contract between the Panama Railroad and the Pacific Mail Steamship Company for dealing with the through traffic between the Pacific terminus of the railroad and California having expired, and no agreement having been reached for its renewal, the railroad company has established a line of its own. The first vessel of the new line was to sail from San Francisco on Wednesday of this week, and the next one is advertised to sail on Jan. 8. On the Atlantic side, the connection to New York, the railroad company is now running, besides its regular weekly steamer for passengers, about two vessels a month for freight.

LOCOMOTIVE BUILDING.

The Aberdeen & Rock Fish is having one engine built by the Baldwin Locomotive Works.

The Terminal Railroad Association of St. Louis is reported in the market for five locomotives.

The Illinois Central is believed to be preparing specifications for a number of new locomotives.

The Chicago Terminal Transfer has ordered six engines from the Baldwin Locomotive Works.

The Alabama & Vicksburg (*Queen & Crescent*) is having two engines built by the Baldwin Locomotive Works.

Thomas Carlin's Sons Co., Allegheny, Pa., has ordered 23 contractor's engines (3 ft. gage) from the Dickson Locomotive Works.

The Delaware, Lackawanna & Western has ordered 10 more locomotives, of the consolidation type, from the Dickson Locomotive Works.

The Hokkaido Mining & Railroad Co., Japan, has ordered three engines from the Schenectady Locomotive Works.

The Costa Rica Pacific has ordered one locomotive, 3 ft. 6 in. gage, with 14-in. x 20-in. cylinders, from the Dickson Locomotive Works. It will be equipped with air-brakes.

The Chicago Great Western order with the International Power Co., signed Nov. 28, calls for 10 compound consolidation engines for May delivery. They will weigh about 180,000 lbs., with 160,000 lbs. on the driving wheels and have 23-in. and 35-in. x 30-in. cylinders; 55-in. driving wheels; wagon top boilers with a working steam pressure of 200 lbs. and 346 tubes 2 in. in diam. and 14 ft. 6 in. long; fire-boxes, Carbon steel, 108 in. long and 40 in. wide; and a tender capacity for 6,000 gals. of water and 10 tons of coal. The specifications call for Tower couplers, Jerome piston and valve rod packings, Leach sanding devices, Michigan lubricators and Detroit springs. At time of writing the other special equipment had not been decided.

The New York, Ontario & Western order with the Cooke Locomotive & Machine Works, placed last month, called for six consolidation engines for delivery in March. They will weigh 200,000 lbs., with 175,000 lbs. on the driving wheels, and have 21-in. x 32-in. cylinders; 55-in. driving wheels; boilers (wide fire-box) with 362 charcoal iron tubes 2¼ in. in diam. and 14 ft. 9 in. long; working steam pressure 200 lbs.; fire-boxes, Carbon steel,

119 in. long and 105 in. wide; and a tender capacity for 5,000 gals. of water and nine tons of coal. The specifications call for Westinghouse brakes, Hammett bell ringers, Sterlingworth brake-beams, Gould couplers, Nathan injectors, U. S. Metallic piston and valve rod packings, Consolidated safety valves, "She" sanding devices, Nathan lubricators and Gold system of steam heat equipment.

The Chicago & Northwestern order, referred to Nov. 20, calls for four passenger (Class D) and 16 freight (Class R) engines, to be built by the Schenectady Locomotive Works. The passenger engines will weigh 158,000 lbs., with 91,000 lbs. on the driving wheels and have 20-in. x 26-in. cylinders; 80-in. driving wheels; radial stay boilers with 338 charcoal iron tubes 2 in. in diam. and 16 ft. long; working steam pressure 200 lbs.; fire-boxes, Carbon steel, 102½ in. long and 65¼ in. wide; and a tender capacity for 5,200 gals. of water and 10 tons of coal. The specifications include Westinghouse brakes, Gollmar bell ringers, Kewanee brake-beams, Chicago couplers, Monitor injectors, Jerome piston rod packings, Ashton open-pop safety valves, Leach sanding devices, Nathan '99 sight feed lubricators, Ashcroft steam gages and Latrobe driving wheel tires. The freight engines will be similar to the standard Class R type of the road, the only particular change being in the fire-box, which will be extended out over the rear of the driving wheels. The dimensions of these engines are: Cylinders, 20 in. x 26 in.; fire-boxes, 100 in. long and 65¼ in wide; heating surface, 2,865 sq. ft. in the tubes and 177 sq. ft. in the fire-boxes; total heating surface, including arch tubes, 3,067 sq. ft., with 46.27 sq. ft. of grate. The tank capacity for water will be 5,400 gals.

CAR BUILDING.

The Chicago, Milwaukee & St. Paul will build 200 wooden ore cars of 100,000 lbs. capacity in its own shops.

The Erie, it is reported, is asking prices on some refrigerator cars.

The Illinois Central will, it is stated, build 300 furniture cars in its own shops.

The Lake Shore & Michigan Southern has ordered 11 cars for passenger service from the Pullman Co.

The Great Northern is said to have ordered 2,000 freight cars from the Haskell & Barker Car Co.

The Ohio River & Lake Erie is again reported as asking bids on freight cars. We have no official information.

The Philadelphia & Reading, it is reported, is in the market for 500 box and 500 gondola cars.

The Pittsburgh, Shawmut & Northern is considering ordering more freight cars.

The Atchison, Topeka & Santa Fe has ordered 300 coal cars from the Illinois Car & Equipment Co. in addition to the order placed some time ago.

The Buffalo & Susquehanna has ordered 200 gondola cars from the Barney & Smith Car Co. They will measure 31 ft. long inside and are intended for coal and lumber. They will be used on the Northern Susquehanna.

The Pittsburgh & Buffalo Coal Co. has ordered 10 hopper bottom coal cars, of 100,000 lbs. capacity, and 100 gondola cars, of 80,000 lbs. capacity, from the Illinois Car & Equipment Co.

The New York, Ontario & Western has ordered 25 steel cars from the Pressed Steel Car Co. and an equal number from the Sterlingworth Railway Supply Co. These will be built from specifications of the builders.

The Chicago, Indianapolis & Louisville order with the American Car & Foundry Co. for four passenger cars, referred to last week, calls for cars to measure 70 ft. long and to be equipped with Sterlingworth brake-beams, Diamond S brake-shoes, Westinghouse brakes, Trojan couplers, Pantasote curtains, Miller platforms, French springs and the Consolidated system of steam heat.

The Rio Grande Western order placed with the Pressed Steel Car Co. calls for 100 steel flat cars of 100,000 lbs. capacity; 100 box cars, 41 ft. long, of 80,000 lbs. capacity; and 100 flat-bottom gondola cars of 90,000 lbs. capacity. These are for January, February and March delivery, respectively. The order placed with the American Car & Foundry Co. for 100 box cars, as noted November 30, is for January delivery. These cars will be 36 ft. 6 in. long, and will be equipped with American cast-steel body and truck bolsters. These last cars will have steel channel center sills, cast-steel draft lugs and tandem spring draft rigging.

BRIDGE BUILDING.

AKRON, OHIO.—According to reports, city and railroad officers are again considering building a viaduct over the tracks on Mill street.

The Akron Realty Co., according to report, has plans for a bridge over the canal on the proposed Kenmore Boulevard.

ALLEGHENY, PA.—The grand jury has recommended that the County Commissioners build a bridge across Dilworth's Run at West Bellevue, connecting the Boroughs of Bellevue and Avalon, for the proposed boulevard from Allegheny to Sewickley.

ARLINGTON, WASH.—The County Board has made arrangements to build eight or nine new bridges from 28 to 40 ft. each aggregating 1,000 ft.

ATLANTA, GA.—The City Council is considering building a viaduct on Peters street over the tracks of the Southern and Central of Georgia railroads. The Atlanta Rapid Transit Co. wants to cross the steam railroads at this place.

ATLANTIC CITY, N. J.—Proposals will be received by the Chairman of the Bridge Committee of the Atlantic County Board of Chosen Freeholders, in Atlantic City, Jan. 2, 1901, at 11 a. m., for building seven cylinder piers, two concrete abutments and fenders, for a bridge on Albany avenue. The superstructure is to be built in accordance with plans and specifications on file at office of M. L. Jackson, Hammonton, N. J. The substructure and superstructure must be bid upon separately. M. L. Jackson, Chairman Bridge Committee; J. J. Albertson, Engineer-in-Charge.

BUFFALO, N. Y.—Bids are wanted, Dec. 26, by the Department of Public Works, for a plate girder bridge over Scajaquada Creek on Delaware avenue, including the necessary alterations of the old masonry and the removal of the present span in accordance with plans and specifications on file in the Office of the Bureau of Engineering. R. G. Parsons, Secretary of the Board. (Nov. 23, p. 782.)

A viaduct is recommended by Judge Lockwood, over the Buffalo, Rochester & Pittsburgh tracks at the new South Parkway.

CHARLEVOIX, MICH.—A drawbridge will be built by the city at a cost of about $20,000.

CHARLOTTETOWN, P. E. I.—Richard Smith, Secretary Department of Public Works, wants tenders for a steel bridge and for concrete abutments at North River.

CHIPPEWA FALLS, WIS.—The Common Council has voted for a steel bridge across the Chippewa River, to cost in the neighborhood of $40,000, and a committee was appointed by the Mayor to secure bids.

CINCINNATI, OHIO.—Plans have been submitted to the Board of Public Safety for extending the Eighth street viaduct. Estimated cost, about $33,000.

CLINTON, IOWA.—The City Council has been petitioned to accept the proposition of the Chicago, Rock Island & Pacific to elevate the tracks on Fifth street between Perry and Scott, and to build a new depot.

DILLON, MONT.—The County Clerk is ordered to advertise for bids for 100-ft. bridge across Big Hole River. The bids will opened at the March meeting.

DOUBLE SPRINGS, ALA.—Winton County will issue $25,000 bonds for new bridges.

DUBUQUE, IOWA.—The Illinois Central, Chicago, Burlington & Quincy, and the Chicago, Milwaukee & St. Paul will be asked to build a viaduct over the Fourth street crossing.

EAST LIVERPOOL, OHIO.—Application is reported made to the Government for permission to bridge the Ohio at the head of Babb's Island.

EAST LONGMEADOW, MASS.—The Special Committee appointed to consider removing the grades at the Robeson crossing in this town has filed its report. A steel bridge, 30 ft. wide, on the present site of the highway is provided for with a 3 per cent. grade each way. The bridge is to cost $22,000, which will be apportioned as follows: Railroad, 55 per cent.; town, 20 per cent.; state, 25 per cent.

GRAND ISLAND, NEB.—Bids are wanted, according to report, on Jan. 1, for all county bridge work during 1901. C. H. Menck, County Clerk.

HAILEY, IDAHO.—Bids are wanted by the County Commissioners, on Jan. 8, for a bridge with 140 ft. span across the main Chehalis.

HARRIMAN, TENN.—The Structural Iron & Steel Co., of Baltimore, Md., has a contract for a viaduct approach to Clinch River bridge at Harriman. It will be 20-ft. roadway and about 600 ft. long; built 15 bay trestle supports, crossing the main line of the Harriman & Northeastern Railroad by girder spans. The extreme height is 30 ft. 6 in. from piers to roadway, with 1 per cent. grade. The work also includes raising one end of a 200-ft. steel span and both ends of a 100-ft. steel span now in place.

INGERSOLL, ONT.—The County Council has decided to build a bridge on the line between East Oxford and North Norwich and to rebuild the approaches to a large steel bridge between East Oxford and Woodstock.

KANSAS CITY, KAN.—The City Council is considering the proposition of the Union Pacific and the Chicago, Rock Island & Pacific to build a viaduct over the tracks on Tenth street.

KANSAS CITY, MO.—The plans for the 731-ft. viaduct proposed by the Metropolitan Street Ry. Co. on Summit street, are approved by the Board of Public Works. (Sept. 14, p. 613.)

LANSING, MICH.—The City Engineer informs us that plans for a 120-ft. bridge over Grand River, at Washington avenue, S., have been prepared, and estimates of cost, preliminary to submitting the question of bonding city at next election.

LONDON, ONT.—The County Council has instructed the Bridge Commissioner to prepare plans and secure bids for the following bridges: Butterfly's flats, over Sydenham River; Mud Creek bridge; bridge opposite lot 16, concession 16, London township, and a bridge opposite lot 1, concession 2, London. Regarding Beattie's bridge on the town line, between Dorchester and London, the Committee suggested a steel superstructure on stone piers.

MERRILL, WIS.—Bids are wanted, on Dec. 22, for the bridges mentioned in this column last week, as follows: A 390-ft. steel bridge, with a 20-ft. roadway and a 6-ft. sidewalk, over the Wisconsin River at South Genesee street, the bridge to be built on one stone abutment, and the remainder of the supports to be tubular piers.

Separate bids are wanted at the same time for a 130-ft. bridge with 18-ft. roadway and a 6-ft. sidewalk, to cross Prairie River at Third street. B. J. Lambert, City Clerk. A. H. Strange, Mayor.

MILWAUKEE, WIS.—The County Board of Commissioners has voted to issue $275,000 bonds for the viaduct proposed across the Menomonee Valley, from the end of Grand avenue to the hill on the west side of the river.

NEWARK, N. Y.—The Newark & Marion Ry. Co., of this place, will build an overhead crossing of the New York Central tracks west of this village.

NEW HAVEN, CONN.—The matter of building a bridge at Bridge street over the Belle Dock railroad tracks is again under consideration. A petition will be sent to the legislature.

NEWMARKET, ONT.—The Grand Trunk, according to report, is preparing to build a bridge on Queen street.

OAKLAND, CAL.—The Alameda County Supervisors are planning to build a new bridge, 80 ft. wide, across San Leandro Creek at cost not to exceed $25,000. Plans and specifications will be received by the Clerk until Dec. 24. Frank C. Jordan, Clerk of Supervisors.

PITTSBURGH, PA.—The Penn Bridge Co. has the contract for the steel bridge over Patterson Hollow, Duquesne Borough, at $13,146.

The Pittsburgh, Fort Wayne & Chicago received bids, on Dec. 14, for the new elevated bridge over the Allegheny River from the following companies: The American Bridge Co., Keystone Bridge Co., Schultz Bridge & Iron Co., and the Pencoyd Iron Works. It will cost over $700,000 and require over 10,000 tons of steel.

PORTO RICO.—The American Bridge Company has a contract to furnish to the Compagnie des Chemins de Fer de Porto Rico two 133-ft. spans for the Manati River Bridge, Porto Rico.

PROVIDENCE, R. I.—A bridge 155 ft. long is reported proposed over the river at Chattlet and Eagan streets.

READING, PA.—The Reading Bridge & Warehouse Co. has been incorporated to build a toll bridge across the Schuylkill River at the foot of Sixth street. The incorporators are John J. Deery, R. J. Purcell, J. Howard Gendell and Thomas F. Durham, and William Abbott Witman, of Philadelphia. Mr. Durham is an Assistant Highway Commissioner of Philadelphia.

ST. JOSEPH, MICH.—Estimates are reported ordered by the Council for a steel viaduct 400 ft. long with 30-ft. roadway and one sidewalk 6 ft. wide. C. S. Rigby, City Engineer.

TROY, OHIO.—An agreement is reported made by the County Commissioners and the State Board of Public Works for a hoist bridge over the Miami and Erie Canal at Ash street.

VICTORIA, B. C.—The City Council will take up the question at an early date of building a steel bridge across the arm at Point Ellice.

WALKERVILLE, ONT.—The Canadian Bridge Co. has been incorporated with a capital of $250,000, by B. S. Colburn, Francis C. McMath and G. F. Porter, of Detroit, Mich.

WASHINGTON, D. C.—The House Committee on the District of Columbia has reported favorably with amendments, the Senate Pennsylvania Railroad grade crossing bill. Under the amended bill the railroad will build two bridges across the Potomac, abolish grade crossings and build a new station.

WILLSBORO, PA.—Five new bridges, it is understood, will be built in Brookfield township, Tioga County, next year.

WILMINGTON, DEL.—The city has accepted the terms of the Baltimore & Ohio relative to the matter of a bridge over the tracks at Sixth street. The company is to build the bridge and the Street and Sewer Department is to build the approaches.

Other Structures.

ATLANTA, GA.—President Wickershaw, of the Atlanta & West Point, Chairman of the committee appointed by the railroads to make the improvements to the depot that the board of health demanded some time ago, has advertised for bids for the work.

BALTIMORE, MD.—Plans have been made by the American Bridge Co. for the improvements contemplated by the Baltimore, Chesapeake & Atlantic on the Light street property on the water front, between Pratt and Camden streets. They include a new wharf of steel, two stories high, with a frontage of nearly 200 ft., and extending out about 165 ft. Each slip will accommodate two steamers. A bridge will be built from the company's offices to the second floor of the wharf.

BIRMINGHAM, ALA.—The Southern Car & Foundry Co. is reported considering building a plant near Birmingham.

BOSTON, MASS.—The New York Central & Hudson River has applied to the Harbor Commission for permission to make improvements at its East Boston terminal. It is desired to widen pier No. 7 some 30 ft. and build the proposed 2,000,000 bu. grain elevator to cost about $1,500,000, at the head of the yard fronting upon Marginal street, in place of the long storage warehouse at that location.

CHICAGO, ILL.—Architects Messrs. Reed & Stem, of St. Paul, Minn., have made plans for a four-story brick freight station, 350 x 80, to be built on the south side of Harrison street, between Fifth avenue and the Chicago River, for the Chicago & Great Western Railroad.

HAZELTINE, PA.—Wm. B. Scaife & Sons, Pittsburgh, Pa., have a contract for a steel frame extension for one of the boiler houses of the Pittsburgh Coal Co., at Hazeltine, Pa. They also have the contract for a steel frame trestle and other structural steel work for the Pennsylvania Mining Co., to be built near Carnegie, Pa.

JOLIET, ILL.—The Illinois Steel Co., we are informed, is considering building a wire mill at Joliet. Plans are reported made.

LOS ANGELES, CAL.—Boiler No. 1, in the Los Angeles-Pacific Ry. powerhouse at Sherman, blew up, on Dec. 5, completely demolishing the boilerhouse and the south end of the engine and dynamo room. The boiler was one of a battery of three, each 2,500 h.p.

MCKEES ROCKS, PA.—The James McKay & Co., Pittsburgh, Pa., will begin work early in the new year on a new plant for its chain works. The location is between the Pittsburgh, Chartiers & Youghiogheny, the Pittsburgh & Lake Erie and the Pennsylvania Lines. The plant will consist of a main building 175 x 85 ft., two stories high, and two wings, respectively 65 x 250 ft. and 40 x 275 ft., the wings to be one-story high. The buildings will be of structural steel and brick, and will be fireproof. The main building will accommodate 100 fires, power plant and a forge department, and is so arranged to be extended to increase the number of fires to 250. The entire plant will be equipped with new machinery, but very little being from the old shops.

MILWAUKEE, WIS.—We are told that the Edward P. Allis Co. is considering building a new plant, but nothing definite is decided.

NEW ORLEANS, LA.—The Louisville & Nashville is reported receiving bids for the new passenger station at the head of Canal street.

PROVIDENCE, R. I.—Wilkesbarre Pier at East Providence, the property of the New York, New Haven & Hartford Railroad, was burned Dec. 18, and 2,000 tons of coal destroyed, causing a loss of about $200,000. Included in the equipment of the pier were an elevator and four engines, all of which were destroyed.

WASHINGTON, D. C.—See Bridge Building.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

American Society of Civil Engineers.

At the regular meeting, held on Wednesday of this week, a paper was presented for discussion by J. I. Boggs on "Some Peculiar Railroad Bridge Accidents."

American Railway Engineering and Maintenance of Way Association.

At a meeting of the Board of Directors, held in Chicago on Dec. 15, it was decided to hold the next annual meet-

ing of the American Railway Engineering and Maintenance of Way Association, in Chicago, on March 12, 13 and 14, 1901. L. C. Fritch, B. & O. S. W. Ry., Washington, Ind., Secretary.

New York Railroad Club.

At the meeting of the New York Railroad Club, held at the rooms of the American Society of Mechanical Engineers, 12 West 31st street, New York city, on Thursday evening, the 20th, Mr. J. V. Davies made an address on "Railroad Tunnels, Their Construction, Maintenance and Operation." The discussion covered the subject of lighting and ventilation.

The Franklin Institute.

At the annual meeting of the section of Photography and Microscopy, to be held on Thursday evening, Jan. 3, the address of the retiring president, Dr. Henry Leffmann, will be the "Applications of Photography to Police and Sanitary Administration."

The annual meeting of the Mechanical and Engineering section will be held Jan. 10, 8 p. m. The address of the retiring president, Mr. John F. Rowland, Jr., will be "Wear and Tear on Steam Boilers."

At the meeting of the Institute on Wednesday evening, Dec. 19, the programme included the report of the proceedings of the Congress of Associations of Inventors, at the Paris Exposition, by Mr. Louis E. Levy, Delegate of the Institute. New Developments in the Fire-Proofing of Wood (with illustrations), by Mr. Joseph L. Ferrell, M. E., Philadelphia.

M. M. & M. C. B. Conventions.

Last week we stated that the thirty-fourth annual conventions of the American Railway Master Mechanics' and Master Car Builders' associations would be held this year at Saratoga, the former commencing June 19 and the latter June 24. Messrs. Woolley & Gerrans, proprietors of the hotel, have made the following terms for members and guests: Single room, without bath, one person, $3.00 a day; double room, without bath, one person, $4.00 a day; ordinary double room, with bath, one person, $5.00 a day; extra large double room, with bath, one person, $6.00 a day; double room, without bath, two persons, $3.00 a day, each person; ordinary double room, with bath, two persons, $4.00 a day, each person; extra large double room, with bath, $5.00 a day, each person. The Committee of Arrangements—Messrs. R. C. Blackall, F. W. Brazier and Harry W. Frost—requests that members of the associations apply at once for rooms.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. F. R. Place, Assistant Superintendent of Telegraph of the Texas & Pacific, died Dec. 7, at Dallas, Tex. Mr. Place was 47 years old.

—Mr. J. A. Miller, who recently resigned as Purchasing Agent of the Ann Arbor, has become General Manager of the Toledo Ice & Coal Company, at Toledo, Ohio.

—Major James Converse, formerly Chief Engineer of the Galveston, Harrisburg & San Antonio, died on Tuesday, Dec. 11, at Abilene, Tex., at the age of 72. Major Converse was one of the pioneer railroad men of the Southwest.

—Mr. Joseph Herrington, who had been elected Railroad Commissioner of Missouri, but who had not yet taken up the duties of the office, died recently at St. Louis. Mr. Herrington was born in Canada and was 46 years of age. He was a conductor on the Missouri, Kansas & Texas.

—Mr. A. C. Shand, Division Superintendent of the Altoona Division of the Pennsylvania at Altoona, Pa., was born in Scotland and came to this country in early youth, locating at Lancaster, Pa. His first railroad service was with the Pennsylvania, begun Nov. 3, 1879, in location and building of branches, and he has since continued with the company. In the spring of 1881 he was transferred to the Pittsburgh office and superintended the building of the shops at Torrens Station. He was appointed Assistant Supervisor of the Southwest Pennsylvania, on Feb. 1, 1882, which position he held until Aug. 21, 1884, when he was appointed Supervisor of the Altoona yard. On Nov. 16, 1889, he was made Assistant to the Engineer of Maintenance of Way at Altoona, and on Aug. 1, 1900, became Principal Assistant Engineer, with office in Altoona.

—Mr. P. T. Downs, the new Assistant General Superintendent of the Seattle & Northern at Spokane, Wash., was born in Ireland, 1847. His first railroad work was as a brakeman on the Central Vermont, begun in 1868. In 1870 he went to the New Orleans, Mobile & Chattanooga, afterwards a part of the Louisville & Nashville, and, in 1886, was made Superintendent of the Louisville Division. In 1891 he entered the service of the Gulf, Colorado & Santa Fe, and was Superintendent of the Northern Division, Superintendent of Transportation, and Acting General Superintendent. In 1897 he became Assistant Superintendent of the Atlanta & West Point, and soon after Superintendent. About a year ago he entered the service of the Great Northern as Assistant General Superintendent, the position he held at the time of his recent change.

—Mr. William E. Brown, long prominent in Southern Pacific circles, died at his home in San Francisco, on Dec. 11, at the age of 76. Mr. Brown was born in Boston and went to California in the early days of that state. He had held many confidential offices in the employment of the Stanfords and the Crockers. He was a Director of the Southern Pacific, and also in banks and in other corporations in which the Southern Pacific capitalists were interested. He had charge of the charitable disbursements of the Crockers for many years. He was interested in the McCloud River Railroad & Lumber Company and had orchards and other property. Mr. Brown was a gentleman of culture and taste and had one of the best private libraries in California. He had given away large sums in various benevolent enterprises, always giving with judgment and discrimination.

—Mr. George A. Fuller, of Chicago, President of the George A. Fuller Company, died last Friday at Mamaroneck, N. Y., of paralysis. He was one of the most famous and successful builders of steel skeleton buildings, having designed such buildings for Boston, Baltimore, Washington, Cleveland, Atlanta, and St. Louis. Among the buildings he put up in New York are the Coe building, the Cushman building, one of the Mills hotels, the Chesebrough building, the Battery Park building, the North American Trust Building, and the Broadway Chambers. Among the structures he erected in Chicago are: Monadnock building, New York Life Building, Rand-McNally building, Columbus Memorial building, Masonic Temple, and many others. The Broadway Chambers which he lately completed in New York, received the grand prize at Paris, and brought gold medals to several engineers and architects concerned in the design and execution of this admirable building. Mr. Fuller was born in Templeton, Mass., in 1851. He was graduated from Andover College, after which he took a special course in the Massachusetts Institute of Technology.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—Robert M. Sheats has been appointed Superintendent of Terminals, Pittsburgh, Pa., effective Dec. 15. (See Pittsburgh Junction.)

Birmingham & Vicksburg.—The officers of this company, referred to in the Construction column, are: President, A. Krauss, Chicago; First Vice-President, H. H. Stodeker; Second Vice-President, I. Gross, Canton, Miss.; Secretary, Dave Levy, Canton; Treasurer, John Walmer, Canton.

Chicago, Milwaukee & St. Paul.—W. J. Underwood has been appointed Assistant General Manager. C. A. Goodnow, heretofore Assistant General Superintendent at Chicago, succeeds Mr. Underwood as General Superintendent.

Chicago, Peoria & St. Louis.—At a meeting, held Dec. 10, T. C. Wellman was elected Assistant Secretary and Assistant Treasurer.

Chicago, Rock Island & Pacific.—F. C. Marshall has been appointed Assistant Treasurer at Topeka, Kan.

Duluth, St. Cloud, Glencoe & Mankato.—At a meeting of the stockholders, held recently, the following officers were elected: President, A. H. Reed, Glencoe; First Vice-President, F. Vollmer, Winsted; Second Vice-President, H. Bruels, St. Clair; Secretary and Attorney, A. E. Clark, Mankato; Assistant Secretary, O. Simons, and Treasurer, J. Richardson, both of Glencoe. (See R. R. Construction Supplement, July 27, 1900.)

Elgin, Joliet & Eastern.—R. A. Dugan, heretofore Purchasing Agent, has been appointed Assistant General Manager of this company and the Chicago, Lake Shore & Eastern, with headquarters at Joliet, Ill.

Erie.—At a meeting of the Board of Directors, held Dec. 13, James J. Hill, Norman B. Ream of Chicago, and Robt. Bacon, were elected Directors, succeeding G. W. Quintard, J. J. Goodwin and S. E. Williamson.

Great Northern.—On Dec. 12, 1900, that part of the Montana Division between west yard limit board at Cut Bank and east switch at Blackfoot became a part of the Kalispell Division.

Grand Trunk.—G. B. Reeve succeeded C. M. Hays as General Manager, on Dec. 15, instead of Jan. 1, as previously announced.

Los Angeles & Salt Lake.—H. Hawgood has been appointed Chief Engineer and H. M. McCartney, First Assistant Chief Engineer. (See R. R. Construction column, Nov. 16, p. 764.)

Monongahela Connecting.—F. McCune, Superintendent of Transportation, will assume additional duties, his title being General Superintendent.

New York Central & Hudson River.—A. Forsyth has been appointed Acting Supervisor of Bridges and Buildings, with headquarters at Watertown, N. Y., succeeding Mr. Johnson, promoted. (See E. & A., p. 817.)

Pennsylvania.—Frank F. Robb succeeds D. M. Watt, transferred, as Division Superintendent at Allegheny City, instead of succeeding Mr. Moss, as stated last week. A. G. Mitchell succeeds Mr. Robb as Superintendent of the Monongahela Division at Pittsburgh, and in turn is succeeded by G. W. Snyder, as Assistant Engineer of the same division. S. L. Shober, Jr., becomes Assistant to the Principal Assistant Engineer at Altoona, succeeding Mr. Cleave. J. Craig Crawford becomes Supervisor at Altoona, succeeding Mr. Snyder, and E. S. Hippey succeeds Mr. Crawford as Supervisor at Patton. J. H. Stadelman has been appointed Assistant Engineer of the Middle Division, Philadelphia & Erie, at Renovo, and Jas. Buckelew Assistant Engineer at Tyrone. The following changes, taking effect Jan. 1, have been made among the Assistant Engineers: L. T. Ford succeeds Mr. Shober as Assistant Engineer at Baltimore, and W. B. Thomson succeeds Mr. Ford at Elmira. The following Supervisors have been appointed, taking effect same date: E. B. Wiseman, at Parkesburg, succeeding Mr. Thomson; Robt. Neilson, Jr., at Millersburg, succeeding Mr. Wiseman; H. H. Russell becomes Assistant Supervisor at Paoli, Pa., succeeding Mr. Neilson, and Mr. Russell is succeeded by J. M. Kinkead as Assistant Supervisor at Parkton.

Philadelphia & Reading.—Edward Shelah has been appointed Superintendent of Sub-Division A.

Pittsburgh Junction (Baltimore & Ohio.)—D. F. Maroney has been appointed General Superintendent, with headquarters at Pittsburgh, Pa. Mr. Maroney is also General Superintendent of the Pittsburgh Division of the B. & O. Robert M. Sheats has been appointed Superintendent at Pittsburgh.

Suffolk & Carolina.—Henry Crocker has been appointed Superintendent of Transportation, succeeding H. P. Brooks, resigned.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALABAMA ROADS.—James Weisel, of Allentown, Pa., and associates are reported to have secured options on 12,000 acres of mineral lands in Jefferson County, Ala., to which they propose to build a railroad.

The Anniston Brown Ore Co. is reported to have awarded the contract to build about three miles of line near Alexander Station to the Alabama Construction Co.

ANTIGO & NORTHWESTERN.—This company has been incorporated in Wisconsin to build the extension of the Chicago & Northwestern from Antigo west 22 miles to Merrill. (C. & N. W., Dec. 7, p. 817.)

ATLANTIC & NORTH CAROLINA.—The directors have decided to ask permission from the next North Carolina Legislature to build the proposed branch from LaGrange northeast about 15 miles to Snow Hill. (Oct. 5, p. 661.)

BALTIMORE & OHIO.—An agreement is reported made between this company and the Droney Lumber Co., to build a branch from Confluence, Pa., southeast about 25 miles into Garrett County, Md., to a new town on the property of the Droney Lumber Co., to be called Unamis. J. R. Droney, of Bradford, Pa., is a director of the lumber company.

The bill is before the House of Representatives to grant this company $1.515,000, of which half is to be paid by the United States, and half by the District of Columbia, for a portion of the expenses of the proposed new terminals and the elimination of grade crossings in the city of Washington, D. C. (Construction Supplement, July 27, 1900.)

BAY SHORE.—This company is reported being organized to build an electric line from Norfolk, Va., to Ocean View. H. L. Page, of Norfolk, is reported interested.

BIRMINGHAM & VICKSBURG.—The company expects to begin surveys within 30 days for its proposed line from Birmingham, Ala., to Vicksburg, Miss. (Dec. 7, p. 817.) The officers are given under Elections and Appointments. (Official.)

BRITISH COLUMBIA ROADS.—Mr. E. G. Tilton, of Vancouver, has given notice of application to the British Columbia Legislature for an act to incorporate a company to build from Victoria northwest to a point at or near Seymour Narrows, Vancouver Island; thence by a bridge or otherwise to the mainland of British Columbia, and thence northeast via either Tete Jenne Cache, or Yellowhead Pass, or near the Pine River, or via Fort George, or the Peace River, to a point at or near the eastern boundary of British Columbia, with a branch to the northern boundary of the province, or to any coast points or mining districts in the Caribou, Westminster or Cassiar districts.

Application will be made to the British Columbia Legislature to incorporate a company to build from Grand Forks to the mouth of Nagle Creek, via the north and east forks of Kettle River and Summit and Nagle Creeks, about 60 miles. The applicants are: R. A. Dickson, George Fraser, E. Spraggett, R. R. Gilpin, A. W. Fraser, Fred Wollaston and J. A. Coryell.

Mr. M. King, of Vancouver, has given notice of application to the British Columbia Legislature for an act to build from a point on Reynolds Sound, Graham Island, thence by the most practicable route to a point at or near Skidegate Harbor, with branches to any points in the Queen Charlotte Islands.

CAMBRIA TERMINAL.—This company has been incorporated in Pennsylvania, with a capital stock of $70,000, to build a railroad seven miles long in Cambria County, from a point in the East Taylor Township through the city of Johnstown to the eastern terminus of Sang Hollow extension of the Pennsylvania. The incorporators are: Powell Stackhouse, of Willingford; Josiah W. Bacon, Alexander P. Robinson, Philadelphia; J. W. Townsend, Bryn Mawr; Charles L. Price and H. L. Endsley, Johnstown.

CANADIAN PACIFIC.—The citizens of Peterboro, Ont., are taking steps to have the Norwood & Apsley line start from their city. The road is projected from Norwood north about 40 miles via Stoney Lake and Warsaw to Coe Hill to connect with the Central Ontario. (Construction Supplement, July 27, 1900.)

CENTRAL OF GEORGIA.—Surveys are reported in progress for completing the Bruton & Pineora extension from Register Still, Ga., east to the main line. (Construction Supplement, July 27, 1900.)

CENTRAL TRACTION.—This company, with headquarters at Richmond, Ind., is reported to have let a contract to J. G. White & Co., New York, for building its electric line from Indianapolis north 65 miles, via Noblesville, to Kokomo.

CHICAGO & NORTHWESTERN.—See Antigo & Northwestern.

CHICAGO, KALAMAZOO & SAGINAW.—Surveys are reported in progress for a branch from Kalamazoo, Mich., southeast about 10 miles to connect with the Grand Trunk at Scotts.

CHICAGO, OKLAHOMA & GULF.—See Western Oklahoma.

CHICAGO, ROCK ISLAND & PACIFIC.—An officer writes, with reference to the proposed Chicago, Rock Island & Mexican extension, noted last week, that it seems probable that the company will extend its line from Liberal, Kan., to a connection with the El Paso & Northeastern at or near the Pecos River in New Mexico, about 260 miles. Two locating parties are in the field. It is probable that the company will do its own track laying and possibly its bridging. No contracts for any part of the work have yet been signed.

CINCINNATI & LICKING RIVER.—Surveys have been made and the company is ready to receive bids for the proposed extension from Brooksville, Ky., south about 28 miles to Johnson Junction. (Construction Supplement, July 27, 1900.)

COLUMBUS, ALBANY & JOHNSTOWN.—This company has filed a mortgage with the Cleveland Trust Co., as trustee, to secure $200.000 5 per cent. bonds, payable July 20, 1920. The company proposes to build an electric line from Columbus, Ohio, to Johnstown, about 32 miles. J. W. Dusenbury is President and L. P. Stephens, General Manager.

EL PASO & ROCK ISLAND.—This company has been incorporated in New Mexico, with a capital stock of $2,500,000, and a like amount of 5 per cent. 50-year bonds, guaranteed by the New Mexico Railway & Coal Co., to build an extension of the El Paso & Northeastern from White Oaks, N. Mex., northeast 130 miles to Santa Rosa, on the Pecos River, to connect with the proposed extension of the Chicago, Rock Island & Pacific. The directors are: Clarence D. Simpson and Thomas H. Watkins, of Scranton, Pa.; Charles E. Eddy, A. S. Greig and W. A. Hawkins, of Alamo Gordo, and J. Howard Ford and Benjamin S. Harmon, of New York City.

FAIR HAVEN & WESTVILLE.—This company has given legal notice to the Connecticut State Legislature of its intention to build its proposed electric extensions. (Nov. 30, p. 802.)

FORT WAYNE & SOUTHWESTERN.—Surveys are reported in progress for this line from Fort Wayne, Ind., along the towpath of the Wabash & Erie canal to Roanoke. W. S. Reed, Wabash, Ind., is interested.

GREAT NORTHERN.—Building is to be begun at once, according to report, on an extension from Kalispell,

Mont., to run southeast about 14 miles to the head of Flathead Lake.

ILLINOIS CENTRAL.—Right of way has been secured, according to report, and the company is to begin soon to build the Canton, Aberdeen & Nashville extension from West Point, Miss., northeast 58 miles to Winfield, Ala. (June 29, p. 458.)

ILLINOIS ROADS.—A. J. Hunter, of Paris, is reported interested in an electric line from that city to Clinton, Ind., to reach the Bruillett's Creek coal fields. It will be 20 miles long and the estimated cost is $160,000.

INDIANA.—This company has been incorporated with $100,000 capital stock to build a railroad 40 miles long from Greenfield, Ind., northeast to a point on the east line of Henry County. The directors are: Francis G. Banker, Nathan C. Burford, Lorenze E. McDonald, William C. Dudding, Christian M. Kirkpatrick, Elmer J. Binford and William R. McKowan.

KANSAS CITY, FORT SCOTT & MEMPHIS.—C. D. Smith & Co. have the contract, according to report, for building a nine-mile branch in Walker County, Ala., from Horse Creek to the mines of the Empire Coal & Coke Co. (Sept. 14, p. 614.)

KNOXVILLE TRACTION.—Surveys are being made and bonuses asked for an electric line from Knoxville, Tenn., north about six miles to Fountain City. Three routes are under consideration. C. C. Howell, of Knoxville, is Manager.

LINDSAY, BOBCAYGEON & PONTYPOOL.—Application is being made to the Canadian Parliament to change the name to the Ontario Northeastern and to continue the line from Bobcaygeon through Verulam and Hardy to a point on the Irondale, Bancroft & Ottawa, within 10 miles of Furnace Mills, and also to make agreement with the Irondale, Bancroft & Ottawa, the Ontario, Lindsay & Pembroke, and the Pembroke Southern lines. The company asks an extension of time for the expenditure of 15 per cent. of the capital stock. (Dec. 7, p. 818.)

LOOKOUT MOUNTAIN.—C. P. King and J. H. Jeffries, of Philadelphia, are reported at Chattanooga, Tenn., organizing companies to control electric lines to run through Chickamauga Park, 10 miles to suburbs at the base of Mission Ridge and to the Heights north of Chattanooga across the Tennessee River. The capital stock will be $2,000,000.

LOS ANGELES & SALT LAKE.—The Empire Construction Co., with $1,000,000 capital stock, has been formed to build this line. Another allied line is the California & Utah Exploration & Development Co., the chief object of which is to buy lands, control town sites, etc. The exact route of the new line is not yet determined, but it is to include about 1,100 miles in all. The company is said to have awarded a contract for 8,000 tons of rails at $26 a ton. The articles of incorporation show that Wm. A. Clark, of Butte, Mont., and R. C. Kerens, of St. Louis, Mo., each own 12,500 shares of the capital stock. (Nov. 30, p. 802.)

LOUISVILLE & NASHVILLE.—An officer writes that there is no truth in the report that the company is to build from Mt. Pleasant, Tenn., to a point below Columbia, as reported. (Dec. 14, p. 834.)

MONTICELLO, FALLSBURG & WHITE LAKE.—This company was incorporated in New York, Dec. 14, with a capital stock of $250,000, to build an electric road 16½ miles long from Fallsburg on the New York, Ontario & Western, to the village of White Lake. The directors are: Theodore B. Dubois, John L. Sommers, and Joseph C. McGuire, of Newark, N. J.; Charles N. Fuller, of Jeffersonville; John H. Wanamaker, of Brooklyn; Louis Hausser, of Harrison, N. J.; John R. McParlan, of New York City, and Joseph G. Terbell, of Liberty.

NACCOCHEE VALLEY.—With reference to this proposed line, W. S. Erwin, of Clarksville, Ga., Auditor of the Tallulah Falls line, writes that a committee was appointed, on Nov. 17, at Clarksville, to take subscriptions for this line and the committee is at work and getting on well. The road is projected from Clarksville in Habersham County, on the Southern, to run to Naccochee, Ga., 15 miles. (Dec. 7, p. 818.)

NEW ORLEANS NORTHWESTERN.—This company has been organized, with a capital stock of $500,000, to build a railroad from New Orleans, La., west about 75 miles to Morgan City. Among those interested are: R. W. Nelson and John B. Taylor, of Newport; Frank P. Helm, of Covington; Joseph A. Humphreys, of Lexington.

NEW YORK, NEW HAVEN & HARTFORD.—Litigation with Wheeler & Howes, of Bridgeport, Conn., regarding condemnation of property needed for the four-track improvements has ended in a compromise and it is expected that the improvements will be pushed forward. (Construction Supplement, July 27, 1900.)

ONTARIO ROADS.—The Canadian Pacific and the Lake Erie & Detroit River are reported considering a project to build a belt line at London.

OREGON SHORT LINE.—Surveys are reported made on a branch from Blackfoot, Idaho, northwest about 90 miles to Houston, with a possible extension to Salmon City.

PITTSBURGH & LAKE ERIE.—Right of way is being secured, according to report, for the proposed extension from New Haven, Pa., south through Dunbar and Uniontown.

PITTSBURGH, WESTMORELAND & SOMERSET.—The people of Somerset, Pa., are making an effort to aid the proposed extension of this line to their city. The road was completed last year by the Byers-Allen Lumber Co. for 11 miles from Ligonier, Pa., toward Somerset. (Construction Supplement, July 27, 1900.)

QUEEN & CRESCENT.—Building is to be begun at once, according to report, on an extension of the New Orleans & Northwestern from Bastrop, La., to the Arkansas State line.

SANTA, PRESCOTT & PHOENIX.—The Prescott & Eastern is reported locating the line from Huron, Ariz., to the Great Belcher and Poland mines in the Big Bug district.

SOUTHERN.—A branch, according to report, is to be built about six miles long from Oliver's Springs, Tenn., in Anderson County.

SOUTHERN ILLINOIS & MISSOURI BRIDGE.—This company has been incorporated in Illinois in the interest of the Chicago & Eastern Illinois to build a bridge and connecting line over the Mississippi River at or near Thebes, Ill. The incorporators are officers of the C. & E. I.

SOUTH HAVEN & EASTERN.—Plans are reported under way for an extension to Paw Paw Lake, Mich.

UNION PACIFIC.—The company is reported to have awarded a contract for $6,000,000 to build what is to be known as the Echo Canyon cut-off between Evanston, Wyo., and Salt Lake City, 40 miles.

UNION TRACTION.—Charters have been granted to the Reading & Birdsboro, with a capital stock of $100,000, to build a line 10 miles long from Reading, Pa., to Birdsboro, and for the Reading & Hamburg, to build a line 15 miles long between Reading and Hamburg, both for the Union Traction Co. Surveys are reported under way.

VANCOUVER & LULU ISLAND.—Mr. F. G. Geddes, Secretary of this company, has given notice of application to the Dominion Parliament for an act to declare the works of this company for the general advantage of Canada, and to extend the time for completing the same, also making Montreal the head office. This is an electric line building from Fairfield, B. C., to the north arm of Fraser River. (Construction Supplement, July 27, 1900.)

WABASH.—An officer is reported announcing that an extension is to be made from Fort Wayne, Ind., northwest about 65 miles to Elkhart.

WEATHERFORD, MINERAL WELLS & NORTHWESTERN.—An officer confirms the statement that the company proposes to build an extension from Mineral Wells, Tex., northwest to Graham, with a branch to Jacksboro. Surveys are in progress. (Dec. 17, p. 818.)

WEST COAST.—This company has been incorporated in Florida, with a capital of $58,000, to build a railroad from Greenville south about 250 miles to a point on the Gulf Coast at or near Tampa. J. W. Oglesby is President; R. C. McIntosh, Vice-President, and C. T. Tillman, Secretary and Treasurer.

WESTERN OKLAHOMA.—This company was incorporated in Oklahoma Territory, Dec. 11, to build the proposed extension of the Choctaw, Oklahoma & Gulf from Weatherford west toward Amarillo, Tex.

WHITE DEER VALLEY.—This company has been incorporated in Pennsylvania, with a capital stock of $30,000, to build a railroad from White Deer to Duncan's Station, Union County, 15 miles.

WINDSOR & LEAMINGTON.—This company is being organized, with a capital of $500,000, to build an electric line from Windsor, Ont., across the river from Detroit, Mich., to run southeast about 30 miles to Leamington. It is stated that building is to be begun in the spring. J. F. Webb, of Ypsilanti, Mich., is the principal promoter.

WINNSBORO & CAMDEN.—Three preliminary surveys have been made for this line from Camden, S. C., on the Seaboard Air Line, to run west 32 miles to Winnsboro, on the Southern. T. K. Elliott, of Winnsboro, is President. (Sept. 21, p. 628.)

WOODWORTH & LOUISIANA CENTRAL.—This company was incorporated in Louisiana, Dec. 8, to build a line 18 miles long from the Rapides Lumber Company's mill at Woodworth toward the Saline River. The road is also to be extended six miles from Woodworth to Lamourie. R. A. Leroy is President; W. S. Smith, Vice-President; John Stewart, Secretary, and Ed. Rund, Treasurer.

YELLOWSTONE PARK.—F. A. Hall, of Livingstone, Mont., Vice-President, writes that surveys are made for this line from Yellowstone Park. He does not expect that contracts will be let before the weather permits of work in the early spring. (Oct. 26, p. 712.)

GENERAL RAILROAD NEWS.

ATLANTIC COAST LINE.—The first dividend of 1 per cent. has been declared on the common stock (including class A), payable Jan. 10, 1901. This is the first dividend on the common stock since the consolidation of April last. The directors have also authorized the payment in January, of 2 per cent. interest on the $3,000,000 4 per cent. certificates of indebtedness. (Oct. 12, p. 680.)

BALTIMORE & LEHIGH.—About 6,500 shares, or more than a majority of the stock, are reported deposited with the Mercantile Trust & Deposit Co., of Baltimore, under the recent offer of Alexander Brown & Son, of Baltimore, of $70 per share. (Nov. 30, p. 802.)

BURLINGTON, CEDAR RAPIDS & NORTHERN.—The New York Stock Exchange has listed the $1,650,000 additional capital stock recently offered to the stockholders at par. The proceeds are to be used to pay for the new line from Germania, Iowa, to Faribault, Minn., about 95 miles. (Nov. 23, p. 784.)

CINCINNATI SOUTHERN.—The trustees of this company have presented to Samuel Spencer, President of the Southern Ry., a copy of a proposed agreement for the extension of the lease of that property. It proposes that the capital stock of the Cincinnati, New Orleans & Texas Pacific, the lessee, shall be increased from $3,000,000 to $5,000,000; that the term of extension shall be 60 years, or until Oct. 12, 1966, and that the rental be $1,200,000 per annum, payable quarterly. The leasing company also is to covenant that it will not enter into any agreement or arrangement whereby the freight or passenger traffic shall be diverted from the railroad, or whereby the same, going to or coming from points north or south of Cincinnati or Chattanooga shall be charged in excess of the charges made by other roads in the territory. The voters of the city of Cincinnati, which owns the road, must ratify the agreement after the Southern Ry. and the trustees of the Cincinnati Southern come to terms. (June 15, p. 408.)

DELAWARE VALLEY & KINGSTON.—See Pennsylvania Coal Company.

ERIE.—At a meeting of the directors, held Dec. 13, new interests in this company were disclosed by the election of James J. Hill, of the Great Northern; Norman B. Ream, of Chicago, a director of the Baltimore & Ohio, and Robert Bacon, of J. P. Morgan & Co., to succeed Messrs. Quintard, Goodwin and Williamson.

GRAND RAPIDS, GRAND HAVEN & MUSKEGON.—This company has increased its capital stock from $100,000 to $1,200,000.

GREAT NORTHERN (CANADA).—The company has made a contract with the Leyland line to charter certain boats for five years to carry grain between Quebec and Great Britain. This will enable the Great Northern to run a weekly service between the two countries. (Oct. 5, p. 662.)

INTEROCEANIC OF MEXICO.—At a special meeting, held Nov. 26, the Board was authorized to issue 4½ per cent. second debenture stock to the amount of £1,300,000 under the plan of reorganization. (Nov. 30, p. 802.)

LAKE SUPERIOR & ISHPEMING.—In addition to the 40 first mortgage bonds, called for payment, as noted last week (p. 834), a further call for $140,000 of the bonds has been made at 105 and accrued interest on Jan. 1 next.

MINNEAPOLIS & ST. LOUIS.—A semi-annual dividend of 2 per cent. has been declared on the common stock, payable Jan. 15 next, which is an increase of ½ per cent. over the last dividend.

MONTREAL & PROVIDENCE LINE.—The company has made a mortgage to the National Trust Co., of Toronto, as trustee, to secure $200,000 4 per cent. 50-year first mortgage gold bonds, guaranteed principal and interest by the Central Vermont, which has leased the line. (Grand Trunk, Nov. 23, p. 784.)

NEW YORK & HARLEM.—The New York Central & Hudson River announces a semi-annual dividend of 5 per cent., to be paid on Jan. 2 next, under the provisions of the contract between the two companies. The rental payable by the Central was 4 per cent. semi-annually prior to the recent refunding of the 7 per cent. bonds. Under the agreement at the time of the refunding, $200,000 of the saving is to go to the Harlem stockholders which is an additional 1 per cent. each half year. In addition, the Metropolitan Street Ry. Co. pays a rental on the Madison and Fourth Avenues St. Ry. line a sum equal to 3½ per cent. per annum, to be increased next year to 4 per cent. The further sum of ½ per cent. is also paid from the income of investments, which makes the present total annual dividend of 14 per cent. to be increased to 14½ per cent., beginning Jan. 1. (July 13, p. 488.)

OMAHA & ST. LOUIS.—Gilman, Son & Co., 32 Cedar street, New York, have issued a circular, dated Dec. 11, stating that holders of about $800,000 of the first mortgage bonds have assented to a proposition to sell their bonds at $700, or to receive at par a new 3½ per cent. first mortgage bond, together with $400 bonus in a new security next to the first mortgage and the payment of the three coupons that will be in default Jan. 1 next. Signatures are asked to a bondholders' agreement to carry this proposition into effect. (Nov. 9, p. 748.)

OREGON RAILROAD & NAVIGATION.—Sealed proposals will be received at the Farmers' Loan & Trust Co., New York, for 134 first mortgage bonds of Sept. 1, 1880, at not to exceed par. (Jan. 12, p. 30.)

PENNSYLVANIA.—The Pennsylvania's 6 per cent. gold interest bearing bonds, secured by mortgage on the United Railroads of New Jersey for $5,669,000, and due March 1, 1901, will be renewed at a lower rate of interest, probably not to exceed 3½ per cent.

PENNSYLVANIA COAL CO.—J. P. Morgan & Co., New York, announce to the stockholders of this company that they have bought a large amount of the stock, including all the stock held by the directors and larger shareholders. The conditions of the sale are that other stockholders shall have the privilege of availing themselves of the opportunity to sell on the same terms. These terms are $276 per share (par $50) in cash, together with a dividend of an estimated value of $100 per share additional, to be distributed to the stockholders from the $10,000,000 treasury assets of the company. This makes the price about $376 per share. The capital stock of the company is $5,000,000, and the property includes, it is said, 22 mines in the Scranton and Pittston fields, containing, according to estimates, 120,000,000 tons of anthracite in sight, and producing annually between 2,200,000 and 2,600,000 tons, with about 5,500 men and boys employed. The purchaser acquires also the franchise and rights of the proposed independent coal railroad to tidewater known as the Delaware Valley & Kingston, and also the Erie & Wyoming Valley line from Scranton to Lackawaxen, 64 miles; also the so-called Hawley branch, leased to the Erie, 13 miles long, and 48 miles of gravity railroad with terminus at Hawley, Pa. It is understood that the purchase is for the Erie. The making of this sale will also kill off the proposed independent road.

PITTSBURGH & CASTLE SHANNON.—W. C. Jutte has completed payment for a majority of the stock on an option obtained some time ago. (March 23, p. 194.)

PITTSBURGH, BESSEMER & LAKE ERIE.—A meeting of the stockholders has been called for Jan. 15, in Pittsburgh, for the reported purpose of ratifying the arrangement by which the Carnegie Steel Co. will assume full control of the property, with a guarantee of 3 per cent. per annum on the minority stock. The Carnegie Steel Co. owns $5,500,500 of the total $10,000,000 common stock, and $500,100 of the $1,500,000 6 per cent. preferred stock. (Dec. 7, p. 818.)

ST. JOSEPH & GRAND ISLAND.—A dividend of 2½ per cent. has been declared on the first preferred stock, payable Jan. 15. The last dividend was 1 per cent., paid in August, and 2 per cent. was paid in January.

SIERRA VALLEYS.—The suit brought by the Southern Pacific to foreclose the mortgage on the rolling stock was decided in favor of the plaintiff by Judge Hall, Dec. 4, granting the $18,965.83 and a decree of foreclosure. (Oct. 19, p. 696.)

WEST VIRGINIA CENTRAL & PITTSBURGH.—The Baltimore Stock Exchange has listed $4,000,000 additional capital stock, making the total amount listed $10,000,000. This new stock was issued to buy the property of the Davis Coal & Coke Co., and 65 per cent. of the capital stock of the Piedmont & Cumberland Ry. (Dec. 15, 1899, p. 872.)

WHITE PASS & YUKON.—Under the proposed arrangement for unifying the mortgage indebtedness with the issue of £750,000 5 per cent. consolidated first mortgage debenture stock, as noted recently (Dec. 7, p. 818), holders of any part of existing stock and debentures on application will receive a preferential allotment of £110 of the new stock in exchange for every £100 of existing securities. Holders of £431,196 out of the £469,830 existing securities, including the holders of all the second debentures, have agreed to the exchange. An amount of £474,316 of new stock will be issued in exchange for the old securities under the conversion. Subscriptions were invited recently in London for the balance of the total £750,000 debenture stock, payable 10 per cent. on application, 10 per cent. on allotment, 30 per cent. one month after allotment, and 50 per cent. one month later. The stock will be secured as a first mortgage on the £752,073 bonds of the local companies owning the railroad, which extends from Skagnay, Alaska, to White Horse, B. C., 112½ miles.